DOCUMENT RESUME

ED 113 892 EC 080 245

AUTHOR Mallik, Kalisankar; Yuspeh, Sheldon
TITLE Bio-Engineering Services to the Developmentally Disabled Adolescent. Final Report.
INSTITUTION George Washington Univ. Medical Center, Washington, D.C Job Development Lab.
SPONS AGENCY Rehabilitation Services Administration (DHEW), Washington, D.C. Div. of Developmental Disabilities.
PUB DATE [75]
NOTE 89p.

EDRS PRICE MF-$0.76 HC-$4.43 Plus Postage
DESCRIPTORS Adolescents; Childhood; *Demonstration Projects; *Equipment; Exceptional Child Education; Material Development; Mobility Aids; Parent Education; Physical Activities; *Physically Handicapped; *Prevocational Education; *Program Descriptions; Recreation; Self Care Skills; Student Evaluation
IDENTIFIERS Developmental Disabilities; Final Reports; Sharpe Health School

ABSTRACT

A 1-year demonstration project involving 24 developmentally disabled students (9- to 20-years-old) with severe physical limitations was conducted to increase their educational and vocational possibilities by using cost-effective bio-engineering techniques to modify their physical environment and develop improved adaptive devices. Phase I of the project consisted of student selection, parent education, and initial evaluation of individual functional abilities. The second phase included using specially designed or commercially available adaptive devices (such as contour seats and wheelchair ramps) to increase functional independence; developing recreational programs (such as a miniature golf course); measuring functional improvement in 50 areas of self-care (such as dressing and eating); providing vocational orientation programs (including training in microfilming and one-handed typing); evaluating each student's functional and vocational potentials and recommending environmental and othotic (supportive device) adaptations; and meeting of project advisors, staff members, parents, and students. Plans for the project's final phase focus on a practical workshop to demonstrate how low-cost, simple designed, bio-engineering adaptations can be used to increase the physically disabled individual's functional level and work capacity. (Provided are descriptions and pictures of adaptive devices used with individual students and 14 appendixes including sample forms for evaluating physical functioning and recreational interests.) (SB)

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DEVELOPMENTALLY DISABLED GRANT #56-P-15435/3-01
SEPTEMBER 1, 1974 - JUNE 30, 1975

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# FINAL REPORT

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# BIO-ENGINEERING SERVICES TO THE DEVELOPMENTALLY DISABLED ADOLESCENT

THE GEORGE WASHINGTON UNIVERSITY MEDICAL CENTER
JOB DEVELOPMENT LABORATORY
WASHINGTON, D.C.

EC 102243

# BIO-ENGINEERING SERVICES TO THE DEVELOPMENTALLY DISABLED ADOLESCENT

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This project was supported, in part, by Developmentally Disabled Grant no. 56-P-15435/3-01 from Region III, Rehabilitation Services Administration, Health, Education, and Welfare, Philadelphia

TABLE OF CONTENTS


I PROJECT PERSONNEL . . . . . 1

II GENERAL OBJECTIVES. . . . . 2

III SPECIFIC AIMS . . . . . 2

IV METHODOLOGY . . . . . 3

PHASE I . . . . . 5

A. Selection of Students . . . . . 5

B. Parent Education. . . . . 5

C. Initial Functional Evaluation . . . . . 6

PHASE II. . . . . 8

A. Utilization of Adaptive Devices to Increase Independence. . . . . 8

1) Designed and Constructed Adaptive Devices. . . . . 8

2) Commercially Available Adaptive Devices. . . . . 25

B. Recreation. . . . . 33

C. Functional Measurements . . . . . 41

D. Vocational Orientation. . . . . 44

E. Evaluation of Functional and Vocational Potential . . . . 45

F. Meetings. . . . . 47

PHASE III . . . . . 48

Workshop and Final Report. . . . . 48

DIAGRAMS, CHARTS, AND GRAPHS

DIAGRAM 1: IMPROVING QUALITY OF LIFE FOR SEVERELY PHYSICALLY DISABLED ADOLESCENTS . . . . . 4

DIAGRAM 2: SPECIFICATIONS FOR FIRST UNIT OF GOLF COURSE . . . . . 21

CHART 1: BIO-ENGINEERING SERVICES TO DEVELOPMENTALLY DISABLED ADOLESCENTS AT SHARPE HEALTH SCHOOL. . . . . 9

CHART 2: USE OF ADAPTIVE DEVICES TO INCREASE INDEPENDENCE IN SELF-CARE . . . . . 42

CHART 3: INCREASED INDEPENDENCE DUE TO UTILIZATION OF ADAPTIVE DEVICES . . . . . 43

GRAPH 1: PHYSICAL FUNCTION PROGRESS RATINGS GRAPHED BY NUMBERS OF STUDENTS IN ATTENDANCE ON EACH DATE THAT MUSIC PROGRAM WAS IN SESSION . . . . . 35

GRAPH 2: MOTIVATION PROGRESS RATINGS GRAPHED BY NUMBERS OF STUDENTS IN ATTENDANCE ON EACH DATE THAT MUSIC PROGRAM WAS IN SESSION . . . . . 36

GRAPH 3: SOCIALIZATION PROGRESS RATINGS GRAPHED BY NUMBERS OF STUDENTS IN ATTENDANCE ON EACH DATE THAT MUSIC PROGRAM WAS IN SESSION . . . . . 37

GRAPH 4: EDUCATION PROGRESS RATINGS GRAPHED BY NUMBERS OF STUDENTS IN ATTENDANCE ON EACH DATE THAT MUSIC PROGRAM WAS IN SESSION . . . . . 38

GRAPH 5: RECREATION PROGRESS RATINGS GRAPHED BY NUMBERS OF STUDENTS IN ATTENDANCE ON EACH DATE THAT MUSIC PROGRAM WAS IN SESSION . . . . . 39

APPENDIX

A. General Description of the Sharpe Health School Students Chosen to Participate In the Project . . . . . 50

B. Agenda: Parent Orientation, October 2, 1974 . . . . . 53

C. Letter Sent to Parents Not In Attendance at October 2, 1974 Meeting. . . . . 54

D. Form: Functional Evaluation of Physically Disabled. . . . . 55

E. Example: Architectural Barriers . . . . . 59

F. Form: Recreational Interests. . . . . 60

G. Example: Psychological Measurements of Sharpe Health School Student. . . . . 62

H. Music Program Lesson Plans . . . . . 64

I. Recreational Resource File Questionnaire . . . . . 66

J. Job Development Laboratory, Job Analysis Form. . . . . 68

K. March 5, 1975 Board of Advisors Meeting: List of Participants . . . . . 69

L. March 19, 1975 Sharpe Health School Staff Orientation Meeting . . . . . 71

M. March 26, 1975 Sharpe Health School Parent and Student Orientation Meeting . . . . . 72

N. Second Board of Advisors Meeting, June 10, 1975: List of Participants . . . . . 73

BIBLIOGRAPHY . . . . . 74

## I PROJECT PERSONNEL

### STAFF

| | | |
|---|---|---|
| K. Mallik, M.S., M. Tech | Princ. Investigator & Bio-Medical Engineer | 15% |
| S. Yuspeh, B.A. | Research Associate & Project Coordinator | 50% |
| R. Sablowsky, M.S. | Vocational Coordinator | 25% |
| P. Kung Foo, M.S. | Instructional Developer | 10% |
| E. Smith, M.A., O.T.R. | Occupational Therapist | 20% |
| J. Mueller, B.I.D. | Industrial Designer | 40% |
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| M. Siler, M.A. | Principal, Sharpe Health School |

## II GENERAL OBJECTIVES

The primary objective of this project is to increase the quality of life for developmentally disabled adolescents. The main means for accomplishing this goal is through the use of cost effective bio-engineering techniques and the introduction of the concept of vocational possibilities for developmentally disabled students at the Sharpe Health School in Washington, D.C. (the D.C. public school for physically and mentally handicapped children).

The goal is to increase the capability of individuals who are functionally impaired by: (1) restructuring of the environment, (2) providing orthotic or supportive devices to the clients.

Bio-engineering adaptations have both immediate and long-range benefits. The immediate benefits are to render a client functionally capable in an activity in which he was formerly dependent on others. The number of self-care activities and recreation skills which an individual can perform are increased whenever possible by making simple changes in his or her surroundings and by supplying supportive aids to increase functional ability both at school and at home.

A secondary objective is to achieve parental cooperation in order to restructure the environment. Parents as well as students are encouraged to participate in all phases including evaluation and recommendations. Parental cooperation helps to define both the student's and family's needs and results in more acceptance of the program. As a result of increased functional independence, less demands are placed on the family, which in turn reduces the student's feeling of helplessness. The family begins to view their child as potentially productive; the student gains confidence in his own ability to be self-sufficient; together they begin to think more constructively about a vocational future.

## III SPECIFIC AIMS

(1) To provide a basis for enhanced educational and vocational possibilities through the application of bio-engineering techniques in redevelopment of orthotic devices for adolescent developmentally disabled students who have severe physical limitations.

(2) To demonstrate that through modification of the environment with adaptive devices, developmentally disabled students can be trained to function in a productive manner, thereby enhancing the quality of their lives.

(3) To eliminate years of inactivity, unemployment, and dependence on family care for these students through early evaluation of work potential and by developing productive skills during the pre-vocational years.

(4) To promote better parental understanding of the disabled adolescent student's potential and to redirect the family's thinking about immediate, future, and long-range goals for these students.

(5) To disseminate the above information to regional representatives of agencies dealing with developmentally physically disabled children at workshops to be held near the end of the project.

(6) To develop a permanent audio-visual resource file of related materials.

## IV METHODOLOGY

The methodology of this research and demonstration project is divided into three phases (Diagram 1):

Phase I. (3 months)
- A. Selection of developmentally disabled adolescents
- B. Parent education
- C. Initial functional evaluation

PHASE II. (6 months)
- A. Utilization of adaptive devices to increase independence
  - 1) Designed and constructed adaptive devices
  - 2) Commercially available adaptive devices
- B. Recreation
- C. Functional measurements
- D. Vocational orientation
- E. Evaluation of functional and vocational potential

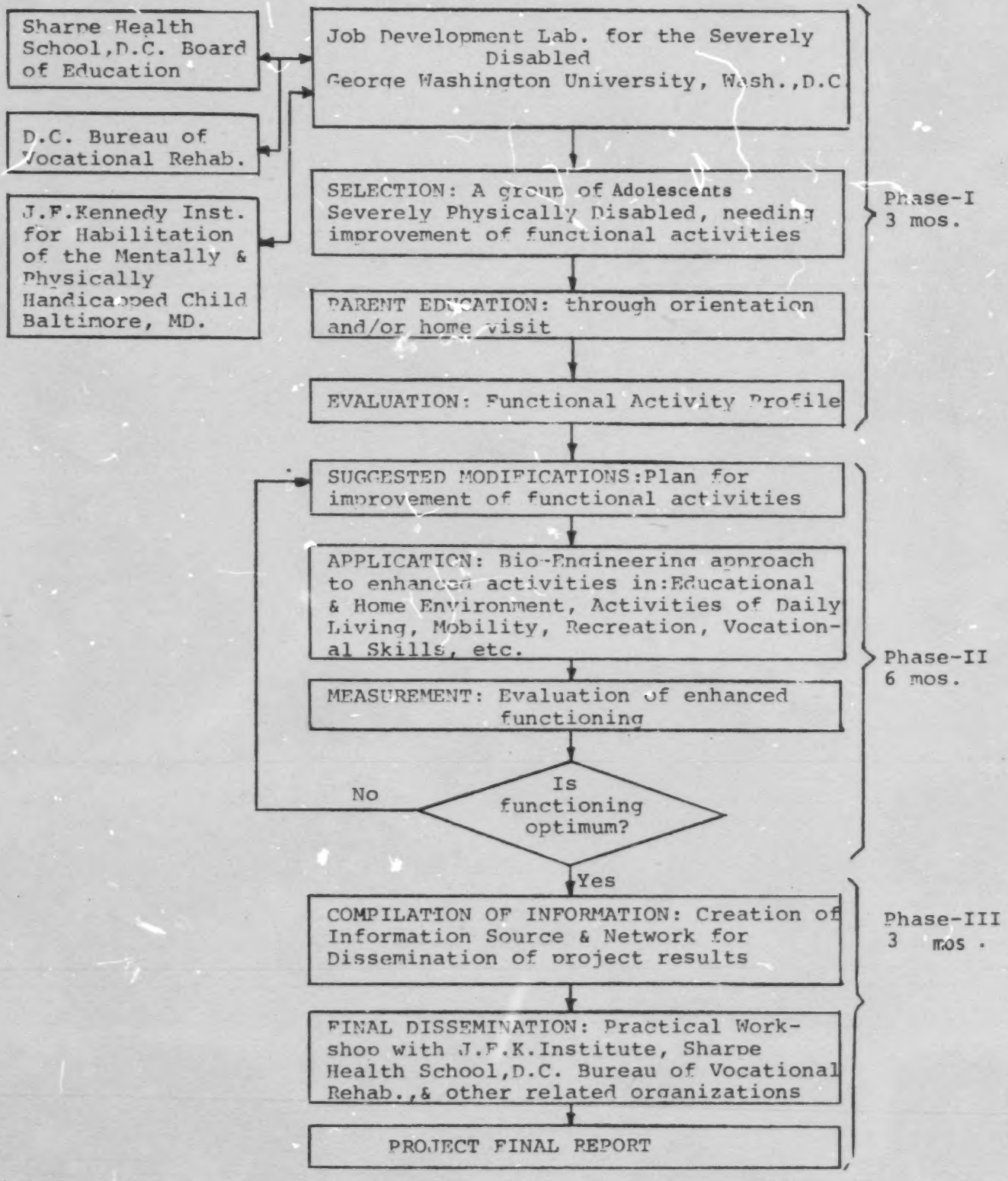
PHASE III. (3 months) Workshop and Final Report and Planning of Regional Workshop

Diagram 1

IMPROVING QUALITY OF LIFE FOR SEVERELY PHYSICALLY DISABLED ADOLESCENTS

Job Development Laboratory

The George Washington University, Med. Center, Wash.,D.C.


Sharpe Health School,D.C. Board of Education
D.C. Bureau of Vocational Rehab.
J.F.Kennedy Inst. for Habilitation of the Mentally & Physically Handicapped Child Baltimore, MD.
Job Development Lab. for the Severely Disabled George Washington University, Wash.,D.C
SELECTION: A group of Adolescents Severely Physically Disabled, needing improvement of functional activities
PARENT EDUCATION: through orientation and/or home visit
EVALUATION: Functional Activity Profile
Phase-I 3 mos.
SUGGESTED MODIFICATIONS:Plan for improvement of functional activities
APPLICATION: Bio-Engineering approach to enhanced activities in:Educational & Home Environment, Activities of Daily Living, Mobility, Recreation, Vocational Skills, etc.
MEASUREMENT: Evaluation of enhanced functioning
Is functioning optimum?
No
Yes
Phase-II 6 mos.
COMPILATION OF INFORMATION: Creation of Information Source & Network for Dissemination of project results
FINAL DISSEMINATION: Practical Workshop with J.F.K.Institute, Sharpe Health School,D.C. Bureau of Vocational Rehab.,& other related organizations
PROJECT FINAL REPORT
Phase-III 3 mos.

PHASE I (Completed 11/30/74)

## A. SELECTION OF STUDENTS

With the cooperation of the school staff, twenty-four students of the Sharpe Health School have been chosen to participate in the project. The following selection criteria were applied:

* Developmental disability with severe physical limitation
* Environmental modification necessary for students to function independently
* 9 years minimum age
* Pre-vocational education level (if applicable)
* Adequate function necessary for job placement and community integration
* Minimum ability to follow instructions
* Ability to decide when assistance is necessary
* Parental cooperation
* Stabilized disease process (no anticipation of prolonged hospitalization)
* Availability of necessary medical information including specific medical characteristics, allergies and precautions.

A general description of the Sharpe Health students chosen to participate in the project is attached. (Appendix A)

## B. PARENT EDUCATION

On October 2, 1974, an orientation meeting (Appendix B) was conducted at the Sharpe Health School by the Job Development Laboratory. Staff members from the Sharpe Health School, project students, and parents of 13 of the 24 selected students were in attendance. Such attendance is considered as above average when compared to attendance at past meetings organized and held at the school.

The purpose of this meeting was to promote better parental understanding of the student's potential and to redirect the family's thinking about immediate and future plans as well as long range goals for these students.

By utilizing background materials from earlier research and demonstration projects on the evaluation and training of severely disabled people at The George Washington University, parents were oriented to the concept that a developmentally disabled child can achieve a degree of independence, both economically and physically.

Parents unable to attend this meeting were mailed letters (Appendix C) explaining the project's goals. These letters were followed up by a phone call from a project staff member so that any questions the parents had could be answered and additional information could be provided.

## C. INITIAL FUNCTIONAL EVALUATION

Home visits were made by the occupational therapist, the recreation therapist, and the bio-engineer during the initial stage of the project. Social and psychological information was collected during home visits. This was also supplemented by the Sharpe Health School psychologist. A functional activity profile was compiled for each student as a result of these evaluations. The home visit included the following assessments:

1) Occupational Therapist:

Physical characteristics such as hand dominance, strength, range of motion, coordination, spasticity, and pain (Appendix D) were evaluated and,

Functional characteristics such as ambulation, transfer, transportation, method of communication, use of typewriter and telephone were observed.

2) Bio-Engineer:

Where present, existing devices or adaptations were examined and the need for new devices or adaptations was evaluated. Architectural barriers (Appendix E) were evaluated to determine accessibility and degree of mobility; for example, handrails or ramps for stairs, rearrangement of furniture.

3) Recreation Therapist:

An interest questionnaire was developed to evaluate the recreational interests of students of the Sharpe Health School. Students were asked what activities on the list they participated in and to what extent, as well as in which activities they would like to participate. The evaluation included skill level in a variety of recreational activities, knowledge of available recreational activities and individual attitude toward the use of free time (Appendix F).

It was found that the main activities of all the participants at home were watching T.V., listening to the radio, and reading. In addition, most of them participated in school activities which included wheelchair football and basketball, swimming, arts and crafts, and socializing. Most of the students commented that they would enjoy doing more activities at home and community but did not or could not because of architectural/environmental barriers, transportation barriers, family apprehension, unavailability of partners, or inaccessibility of materials.

Based upon the findings of this questionnaire, plans are being made to concentrate on the recreational aspects of the home. The main emphasis will be in providing leisure counseling and recreational activities in the home. A recreational resource questionnaire (Appendix I) will be sent to community rec-recreational facilities in order to compile a resource file to be used, at a later date, in expanding the recreational opportunities of the individuals out into the community.

4) Rehabilitation Counsellor/Psychologist:

The evaluation of social and psychological characteristics included an assessment of educational experience, vocational experience and aspirations, use of free time, and psychological testing in the areas of motivation, intelligence, interests, and aptitudes (Appendix G).

PHASE II (12/1/74 - 5/31/75)

## A. UTILIZATION OF ADAPTIVE DEVICES TO INCREASE FUNCTIONAL INDEPENDENCE

Recommendations for environmental modifications and adaptive aids were made by project staff after evaluating the functional activity profiles developed for each student (see Chart 1). A study of commercially available aids, applicable to solving the identified problem, was made. The effectiveness in solving the specific problem relative to its purchase price was assessed to determine cost benefits. If satisfactory commercial aids were not available, new aids were designed and constructed to meet the needs of the individual. Adaptive aids are being utilized to increase the functional independence of students both in the home and/or school setting. Examples of such bio-engineering aids are described below.

### 1) Designed and Constructed Adaptive Devices

#### a) Record Player Controls

The record player, available for classroom use, is controlled by a series of cylindrical knobs which are difficult to turn without the conventional grasp and twist. The mode selector was changed from a knob to a lever for greater mechanical advantage. The remaining knobs controlling volume, tone, treble, and bass were changed from the existing cylinders to knobs which afford greater surface area and ease of control without requiring twist and grasp. Some of the students (slow learners) had a tendency to pull the knobs rather than turn them. As the modified controls require only a push to turn them, no grasping surface was required. Therefore, the surfaces were tapered to prevent pulling them.

ADAPTED CONTROLS FOR RECORD PLAYER

Materials: Dow surgical silicone and polyester resin

Cost of Materials: $6.00

14

Chart 1

BIO-ENGINEERING SERVICES TO DEVELOPMENTALLY DISABLED ADOLESCENTS AT SHARPE HEALTH SCHOOL

ADAPTIVE DEVICES OR MODIFICATION FO

| Client | Age | Grade | Disability | Activities of Daily Living Need | Activities of Daily Living Received | Environmental Barriers Need | Environmental Barriers Received | Lei Ne |
|---|---|---|---|---|---|---|---|---|
| H.F. | 19-3 | 11 | Cerebral Palsy | X | X | X | * | |
| S.L. | 19-11 | 11 | Cerebral Palsy | X | X | | | |
| A.G. | 17-6 | 11 | Muscular Dystrophy | X | X | X | X | |
| L.T. | 16-5 | 11 | Muscular Dystrophy | X | X | X | * | |
| H.G. | 18-7 | 12 | Muscular Dystrophy | X | X | X | X | |
| K.S. | 18-10 | 12 | Arteriovenous malformation/brain | X | X | X | X | |
| A.W. | 17-6 | 7 | Cerebral Palsy | X | X | X | X | |
| R.J. | 16-7 | 9 | Cerebral Palsy | X | X | | | |
| D.M. | 18-10 | 9 | Cerebral Palsy | X | * | X | X | |
| S.M. | 17 | 10 | Osteogenesis Imperfecta | X | X | X | * | |
| E.R. | 17-3 | 9 | Osteogenesis Imperfecta | | | | | |
| S.F. | 15-4 | 9 | Paraplegia | X | * | | | |
| W.D. | 19-4 | Grad. | Muscular Dystrophy | X | X | X | * | |
| M.T. | 21 | Grad. | Muscular Dystrophy | X | X | X | X | |
| R.T. | 19-10 | Grad. | Muscular Dystrophy | X | X | X | X | |
| C.F. | 19-4 | Grad. | Hoffman's Disease | X | X | X | X | |
| J.L. | 19-11 | 12 | Paraplegia | X | X | X | * | |
| D.H. | 15-7 | 10 | Osteogenesis Imperfecta | | | | | |
| J.L. | 18 | 10 | Osteogenesis Imperfecta | X | X | | | |
| S.R. | 16 | 9 | Osteogenesis Imperfecta | X | * | | | |
| D.P. | 18-6 | 8 | Cerebral Palsy | | | | | |
| V.R. | 17-2 | 11 | Quadriplegia | | | X | X | |
| G.R. | 12 | 5 | Blind Quadriplegia | X | X | X | X | |

* Items needed but not received are presently under construction.

Chart 1

NG SERVICES TO DEVELOPMENTALLY
ESCENTS AT SHARPE HEALTH SCHOOL

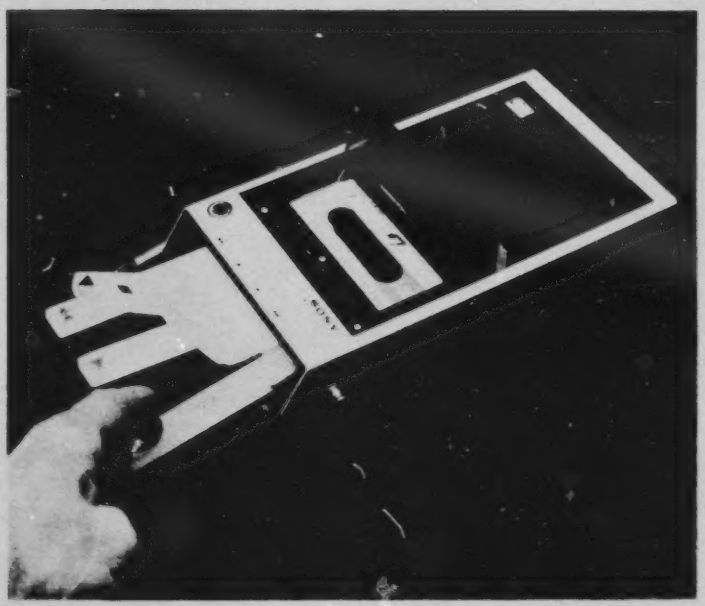
ADAPTIVE DEVICES OR MODIFICATION FOR:

| Grade | Disability | Activities of Daily Living Need | Activities of Daily Living Received | Environmental Barriers Need | Environmental Barriers Received | Leisure Time Activities Need | Leisure Time Activities Received |
|---|---|---|---|---|---|---|---|
| 11 | Cerebral Palsy | X | X | X | * | X | * |
| 11 | Cerebral Palsy | X | X | | | X | X |
| 11 | Muscular Dystrophy | X | X | X | X | X | * |
| 11 | Muscular Dystrophy | X | X | X | * | X | * |
| 12 | Muscular Dystrophy | X | X | X | X | X | * |
| 12 | Arteriovenous malformation/brain | X | X | X | X | X | * |
| 7 | Cerebral Palsy | X | X | X | X | X | X |
| 9 | Cerebral Palsy | X | X | | | X | X |
| 9 | Cerebral Palsy | X | * | X | X | X | X |
| 10 | Osteogenesis Imperfecta | X | X | X | * | X | * |
| 9 | Osteogenesis Imperfecta | | | | | X | X |
| 9 | Paraplegia | X | * | | | X | X |
| Grad. | Muscular Dystrophy | X | X | X | * | | |
| Grad. | Muscular Dystrophy | X | X | X | X | X | X |
| Grad. | Muscular Dystrophy | X | X | X | X | X | X |
| Grad. | Hoffman's Disease | X | X | X | X | | |
| 12 | Paraplegia | X | X | X | * | | |
| 10 | Osteogenesis Imperfecta | | | | | X | X |
| 10 | Osteogenesis Imperfecta | X | X | | | X | * |
| 9 | Osteogenesis Imperfecta | X | * | | | X | X |
| 8 | Cerebral Palsy | | | | | X | X |
| 11 | Quadriplegia | | | X | X | X | X |
| 5 | Blind Quadriplegia | X | X | X | X | X | * |

ut not received are presently under construction.

b) Tape Recorder

The tape recorder switches are arranged in a bank of equal size tabs set close to each other, so that from a tactile standpoint, there is little distinction between them. In addition, the switches were hard to press for students who have coordination problems. Detachable switch surfaces were added which extended from the existing switches at incremental lengths and in a stepped pattern thus adding a slight mechanical advantage to the switch action as well as tactile distinction.



ADAPTED LEVERS FOR TAPE RECORDER

Materials: polypropylene
Cost of Materials: $1.50

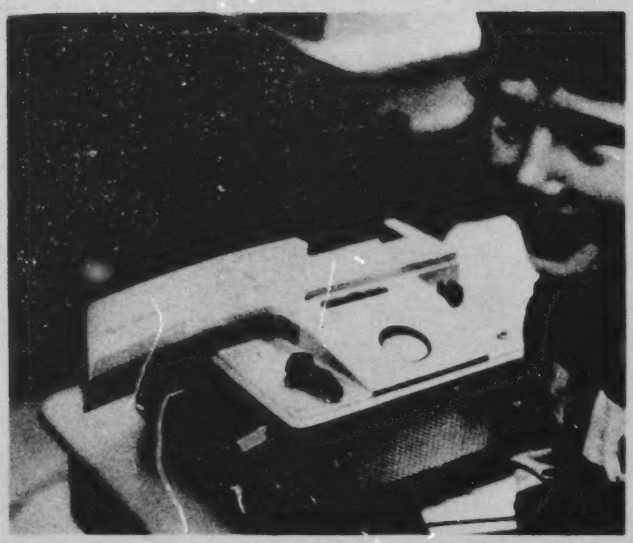
c) Card Reader

The card reader is basically a tape recorder which records and plays back via a strip of magnetic tape along the lower edge of the card. Along the upper edge of the card is a sentence and an illustration corresponding to the thought of the sentence. The student feeds the card into the machine and reads the sentence which is recorded. He then reinserts the card to listen to the sentence.

The problem in this case stemmed from the fact that where the card is ejected, it falls to the floor before the student can grasp it. A pair of clear acetate leaves which grasps the card without restricting its passage through the recorder were added so that the student can easily pull the card from the leaves.

A minimal acetate thickness was used so that students with coordination problems could not damage the leaves or injure themselves on a less flexible protrusion.

(see continuation, next page)



ADAPTED CARD STABILIZER FOR CARD READER

Materials: acetate leaves
Cost of Materials: $.50

d) Modifications for R.T. and M.T. in institutional setting

R.T. and M.T. have muscular dystrophy and are confined to electric wheelchairs at the Home for Incurables. This environment presents basic everyday problems to their lifestyle, particularly their hobbies, cartoon illustration, and popular music. They spend as much time as possible drawing, painting, and sketching, and when the art room is closed or they become too tired, they take advantage of their extensive record collection.

Since the activity room is not always available and creativity does not always fit an institutional schedule, the objective was to provide facilities in the clients' own room. We, therefore, designed a table similar to the one in the art room, providing easier wheelchair access, space for game drawers to be added later, and a shape more suited to their particular space requirements. We also constructed a special holder for pens and pencils as picking up drawing tools from the table is a problem for M.T.

These clients have a hi-fi arrangement which consists of one speaker and two separate amplifiers for phonograph and radio. To allow them to operate these without constant switching of speaker plugs and power supplies, both amplifiers were wired to the speaker through an audio mixer, and both power cords plugged into an outlet extension, thus allowing them to change from radio to phono without additional switching.

R.T. and M.T. also had no means of turning their television on and off for evening entertainment, or for calling nurses if the need arose. Remote touch switches (requiring only 1/2 lb. of force to operate) were wired to give them these capabilities.

Finally, since the bathroom mirrow was too high for the wheelchair bound, a lower mirrow was supplied.

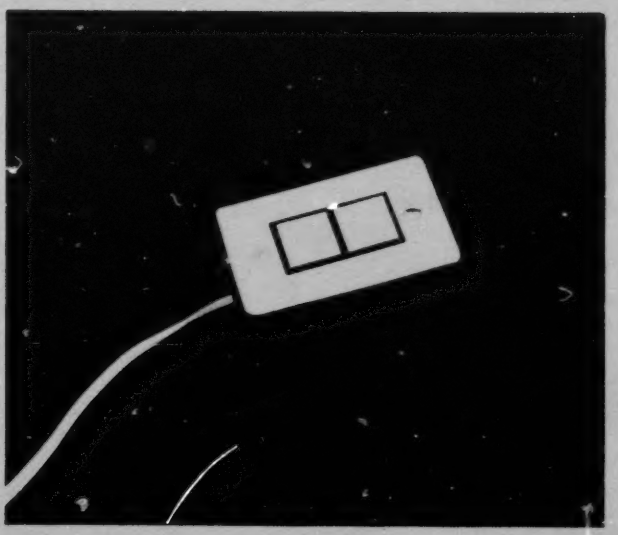
These changes in environment make it easier for M.T. and R.T. to enjoy the activities and fulfill the necessities which are most important to them.

17

(continued)

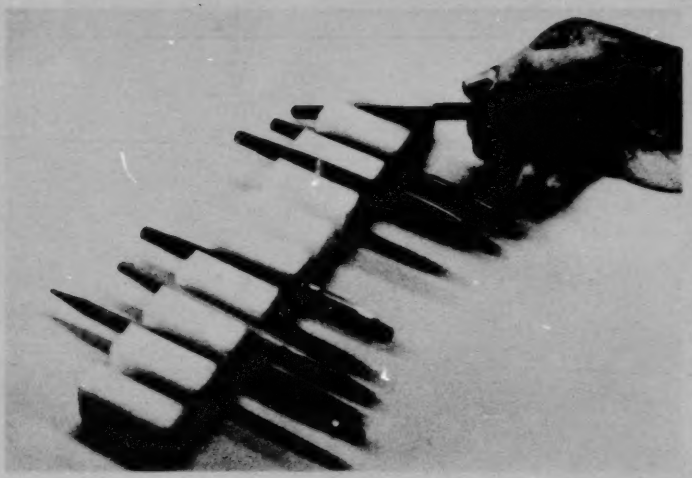
ADAPTED TABLE

Materials: wood, Formica top, contact cement, polyurethane
Cost of materials: $30.00



ADAPTED SWITCH

Materials: Leviton AC single pole quiet switch
Cost of materials: $3.99
Supplier: hardware store



PEN AND PENCIL HOLDER

Materials: wood, contact cement, high density polyethylene
Cost of materials: $1.00

LOWERED MIRROR

Materials: wood, mirror
Cost of materials: $1.50

e) "Get-Up Box" and Ramp

H.G. has developed a routine using a pedestal for getting out of bed in the morning. The objective was to construct a pedestal as exactly to his specifications as possible. A finished wooden box of 7" x 6" x 9 1/2" dimensions was built with a vinyl-covered foam cushion on top for added comfort. With this device, he is able to transfer himself from his bed to his wheelchair independently.

Both H. and A. need assistance in entering and leaving their home due to the front steps and sidewalk configuration. An all-weather wooden ramp was designed to make it possible for them to drive their wheelchairs from the sidewalk directly into their home without assistance.

"GET-UP BOX"

Materials: wood, polypropylene
Cost of materials: $3.00

RAMP

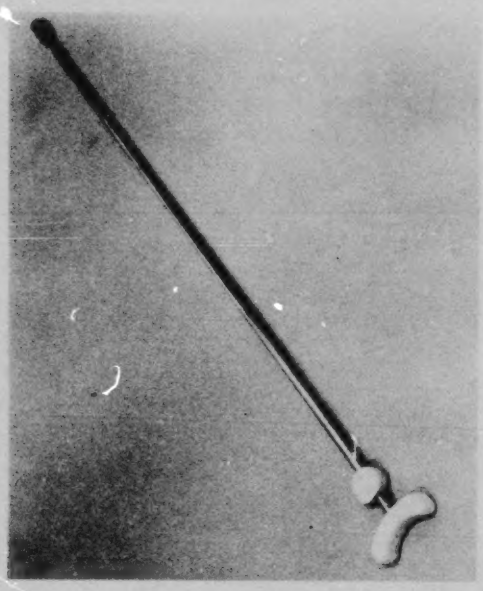
Materials: wood, stair tread vinyl
Cost of materials: $25.00

f) V. R.'s Mouthstick and Straw

The layout of V.R.'s bedroom necessitated the location of his stereo system well out of his reach from his electric wheelchair. A mouthstick would easily solve this problem, as the controls are particularly easy to operate. However, the length required was approximately 24", well beyond the reach of the average mouthstick. The added length presented a problem of weight and stability which was solved by the design of a new mouthpiece.

The mouthpiece was molded of surgical silicone rubber in two pieces. One piece was fixed to the end of the stick, to be grasped by the molars, the other slides along the stick to fit the location of the front teeth. This design provides gripping surface for both sets of molars and the front teeth. This three-point grip gives greater stability and control needed for manipulation of the mouthstick.

V.R. has a large water pitcher at his bedside which he uses rather than a drinking glass. He needed a long straw to use this pitcher, one was formed from acrylic tube in the desired length and configuration



LIGHT WEIGHT 24" MOUTHSTICK

Materials: Dow surgical silicone
aluminum rod
Cost of materials: $2.00

ADAPTED PLEXIGLAS STRAW

Materials: Plexiglas straw
Cost of materials: $.15

g) A.W.'s Chair

A.W.'s apartment, its doorways, hallways, etc. prohibit easy mobility in a wheelchair. Consequently, she was forced to find other ways to move about for the short distances required. She used a wooden chair to "scoot" from room to room, but this became as hard on the chair as it was on the floor.

An existing castered secretary's chair was modified by lowering it so that her feet would touch the floor, thus giving her the same mobility with greater ease.

LOWERED, WHEELED SECRETARY'S CHAIR
FOR MOBILITY

Materials: wheeled, secretary's chair
Cost: This chair was donated to the project.
A similar chair can be purchased second hand for about $5.00 - $10.00

P 21

h) J.L. and D.M.'s Contour Seats

1) J.L.'s Contour Seat:

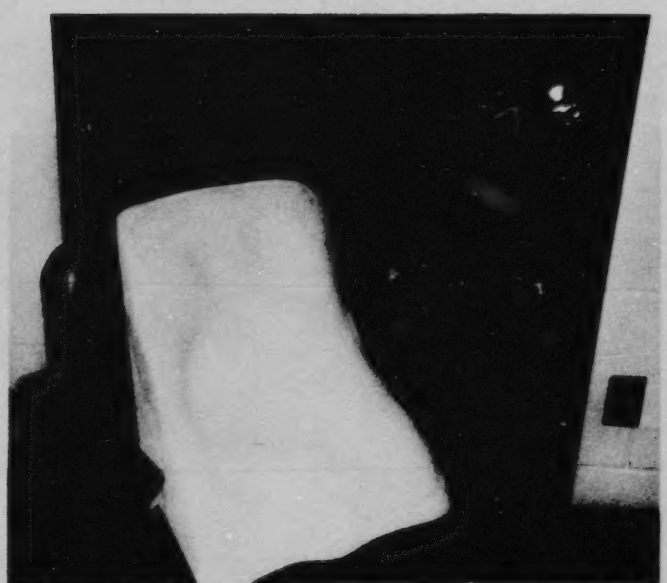
Chief Complaint: Inability to maintain adequate sitting position in automobile and therefore unable to receive driver's training.

Prescription: Contoured seat (portable - to be used both in and out of automobile and in regular chair).

Fabrication procedure:

a) A large plastic bag filled with 1/8" styrofoam beads was placed in wooden chair form and connected to vacuum system.
b) Client was placed in bag in optimal sitting position. Bead-filled bag was positioned around her to fill in contours of her anatomy.
c) Air was evacuated via vacuum system.
d) Client was removed from bag leaving rigid impression as vacuum was maintained.
e) Hollow impression was filled with plaster and allowed to harden after which it was removed and modified.
f) Vacuum forming procedure using 3/8" polypropylene was used over plaster mold.
g) Polypropylene shell was mounted in rigid foam and finished with coat of polyester resin.

Result: Client able to use seat in automobile enabling her to receive driver's training. This seat can also be used in any regular chair and will provide a more functional sitting position. Utilization of this chair in typing class allows her to sit whereas, before, she was standing to type.



J.L.'s CONTOUR SEAT

Materials: polypropylene, polyurethane foam, nylon reenforced polyester resin

Cost of materials: $70.00

2) D.M.'s Contour Seat:

Chief Complaint: Poor sitting posture in wheelchair necessitating use of numerous straps to keep client in chair.

Prescription: Contoured seat for wheelchair.

Fabrication procedure: same as for J.L.'s contour seat

Result: After secondary modifications were made to contoured seat, client is able to sit in a more upright, more functional position. Straps are still necessary and maximal tolerance has not yet been gained but the advantage of more functional sitting position is present. Several functional activities were impeded as a result of use of this seat:

a) Client was unable to urinate in the manner previously used, necessitating the client to be transferred from chair, thus cutting down on the amount of time client could remain in chair.

Solution: A female urinal was ordered and client taught to use it while sitting. Appropriate structural adjustments were made to the contour seat.

b) Client was unable to remove slacks or to pull them down to urinate.

Solution: Slacks were adapted by use of a zipper with a large ring. Client was taught a method to pull slacks down and a way to put them on.

c) Client was unable to transfer using method previously learned.

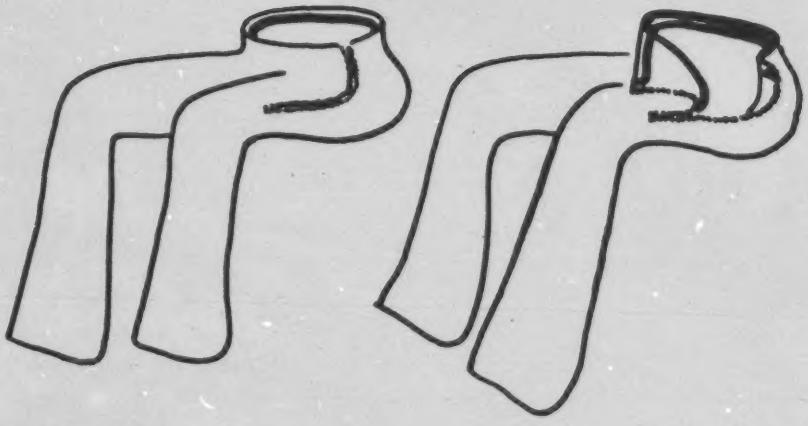
Solution: Client was taught a new method for transfer.

D.M.'s CONTOUR SEAT

Materials: polypropylene, polyurethane foam, nylon reenforced polyester resin

Cost of materials: $70.00

ADAPTED PANTS



Pants have 12" seam

The right hand seam of the pants was opened about 12-15". A jacket type nylon zipper with ring was inserted. Pants could then be unzipped and the front pulled over to the side allowing urinal to be inserted while client sits. Knit pants are preferable as they have more "give" than other fabrics.

i) S.L.'s Hand Orthosis and Drinking Glass

1) S.L.'s Hand Orthosis

Chief Complaint: Decreased function of dominant upper extremity due to athetosis.

Prescription: Long opponens orthosis with C-bar

Fabrication procedure:

1) Client was casted with wrist in neutral position with thumb opposing digits.
2) Plaster mold was made and modified.
3) Orthosis cut and formed to mold using nyloplex.

Result: Orthosis provides a degree of stability at wrist by preventing acute flexion. Thumb is held in opposition. Whether or not function has been increased is questionable.

2) S.L.'s Drinking Glass

The spasticity of S.L.'s arms made it impossible for him to hold a conventional drinking glass without considerable spillage.

A 16 oz. high-impact styrene drinking glass was purchased to which a polypropylene loop handle was attached. This allows S.L. to hold the glass by simply inserting his hand into the loop. The large capacity of the glass allows it to hold a considerable amount of liquid even though it is only half filled to avoid overflow and spillage due to spastic movements.

HAND ORTHOSIS

Materials: Nyloplex, velcro
Cost of materials and labor: $100.00

DRINKING GLASS

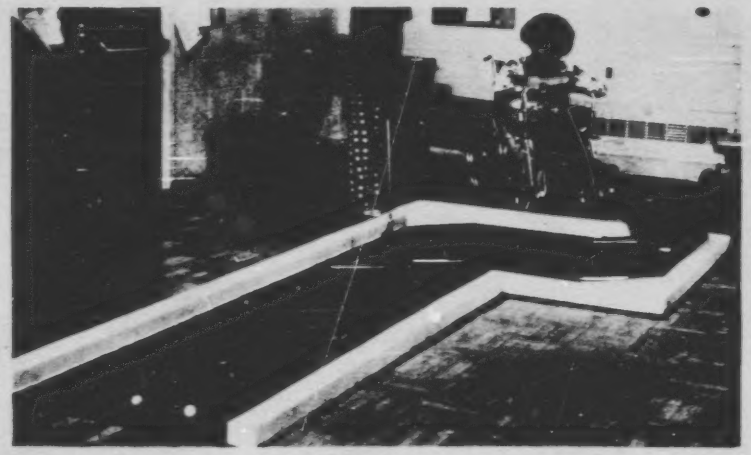
Materials: Styrene drinking glass, polypropylene handle
Cost of materials: $1.10

j) Portable Miniature Golf Course

Most public miniature golf courses are models of inaccessibility for the handicapped. Barriers which keep the golf balls on the course serve to keep wheelchair players off, and most of the clever, colorful obstacles are more than obstacles to the disabled.

With these problems in mind, a miniature golf course was conceived utilizing high-density foam barriers and obstacles which would provide no hindrance to the disabled player. The actual hole was set into a movable base to allow relocation of the "green" for greater versatility of play. With this one piece removed, the course may be rolled up like a rug for easy storage (see diagram on next page for exact specifications).

Conventional colored golf balls and a conventional putter are being used at present.



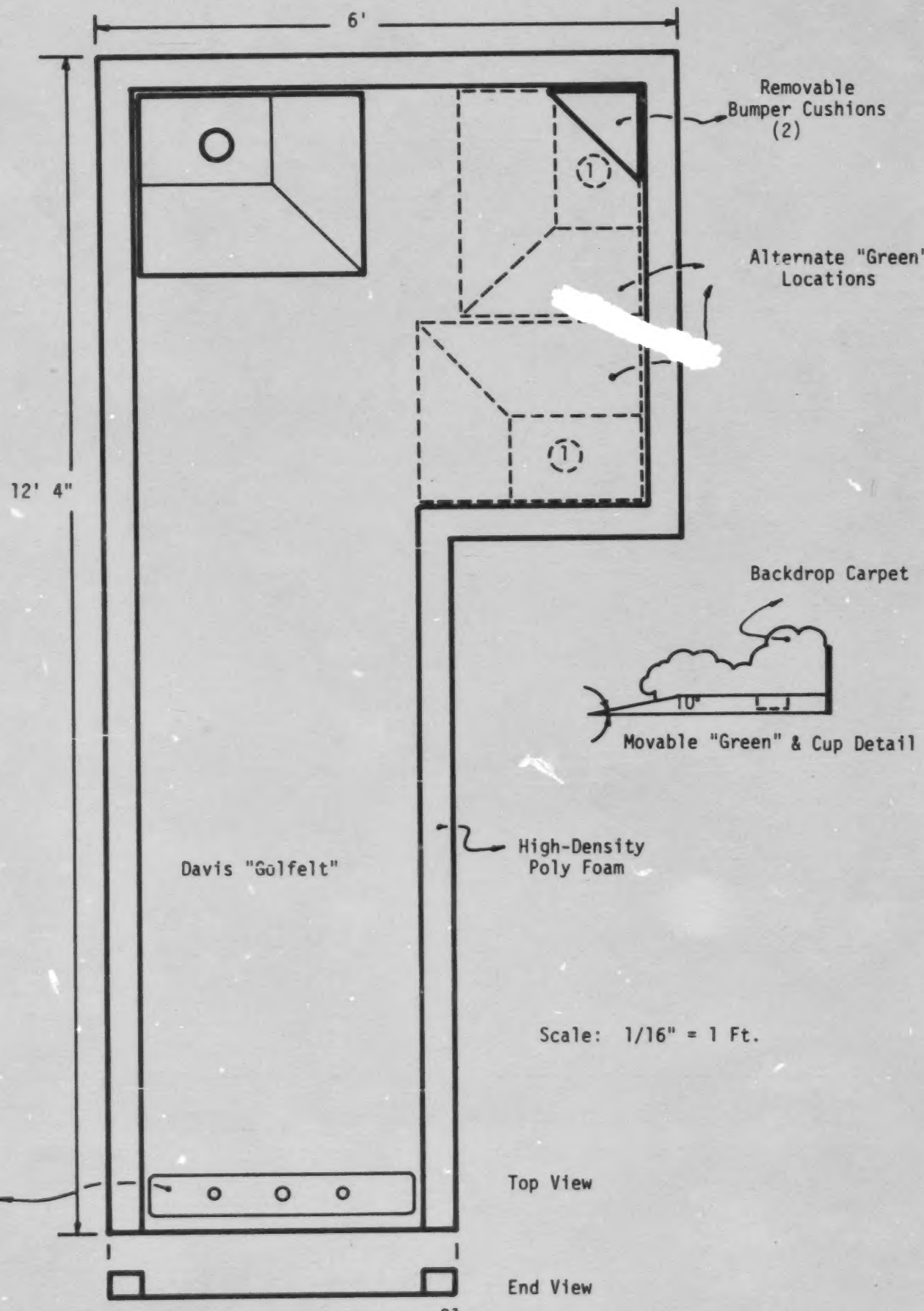
MINIATURE GOLF COURSE

Materials: Davis Evergreen Golfelt, high-density polyethylene foam, contact cement, wood (for "green" assembly)

Cost of materials: $51.20

Diagram 2

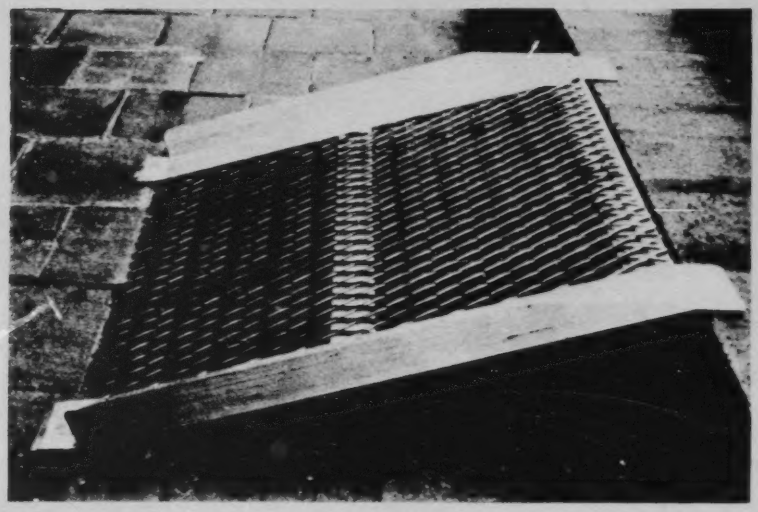
SPECIFICATIONS FOR 1ST UNIT OF GOLF COURSE



k) C.F.'s Wheelchair Ramp

Two steps outside C.F.'s apartment, coupled with the considerable combined weight of C.F. (210 lbs.) and his electric wheelchair (160 lbs.) had caused structural damage to the wheelchair frame on his way to and from his daily work.

As the steps are on public land and heavily used by pedestrian traffic, a permanent ramp was unfeasible. Therefore, two aluminum ramps were designed for the steps as a compromise between portability and ease of use; i.e., ramp angle. Because C.F.'s driver helps him into his house, the power of his wheelchair and the driver's strength allowed a more severe ramp angle than generally recommended and, therefore, greater portability.



WHEELCHAIR RAMP

Materials: 4" structural aluminum U-channel, webbed iron mesh

Cost of materials: $33.00

F 28

1) L.B.'s Wheelchair Support-Seat

L.B., a profoundly retarded, physically handicapped student, had no trunk or neck control to support herself in a sitting position in her standard wheelchair.

Critical body measurements were used to fabricate a semi-reclining wheelchair seat with lateral trunk support and adjustable head support.

The upholstery was done with heavy duty vinyl mounted on detachable cushions for easy cleaning and subsequent adjustment.

L.B.'s WHEELCHAIR SUPPORT-SEAT

Materials: vinyl, 3/4" particle board, hardware, paint, high-density foam, miscellaneous wood
Cost of materials: $18.00

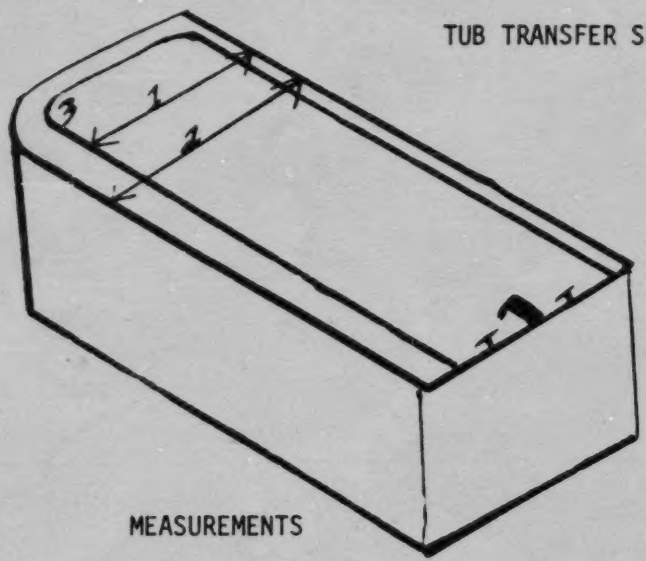
m) J. L.'s Tub Transfer Seat

J.L. had much difficulty getting down into the bathtub due to paraplegia. The method he used was unsafe. To prevent falls and to allow complete independence in taking a shower, the tub transfer seat was made.

This tub seat is very stable when wedged between the tub and wall and resting on the two rims of the tub. It allows persons with paraplegia, arthritis, cerebral palsy, cerebral vascular accident, or any disorder that requires sitting while bathing to take a sponge bath or shower without having to get down into the tub.

The procedure he used with this transfer seat is to sit on the seat with legs outside the tub, lift legs into the tub one at a time, slide to the center of the seat, and reach forward to operate the faucets.

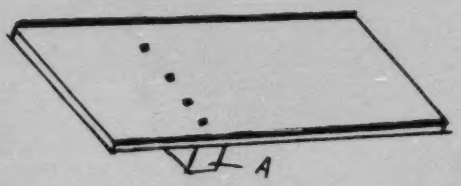
TUB TRANSFER SEAT



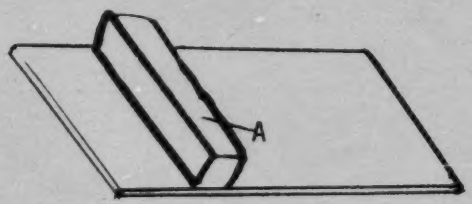

MEASUREMENTS

1. From wall to outer rim
2. From wall to inner rim
3. Allow for curve if seat is to fit against wall at back of tub

TOP VIEW




A - WEDGE TO PROVIDE STABILITY




BOTTOM VIEW

Materials: seasoned wood (11" wide, 3/4" thickness, 2" x 2" wedge), polyurethane (three coats)
Cost of materials: $2.00

Tub Transfer Seat Design
Credit: Gloria Furst, OTR

2) Commercially Available Adaptive Devices

The adaptive devices for "dressing","hygiene", "transfer","eating","accessibility", and "reacher" as listed in this section are available from the following suppliers:

- The Hill Rom Store
  4916 Fairmont Avenue
  Bethesda, Md. 20014
  Phone: (301) 986-1031

- The BK numbers are from:
  Be OK Self-Help Aids
  Fred Sammons, Inc.
  Box 32
  Brookfield, Ill. 60513
  Phone: (312) 246-3216

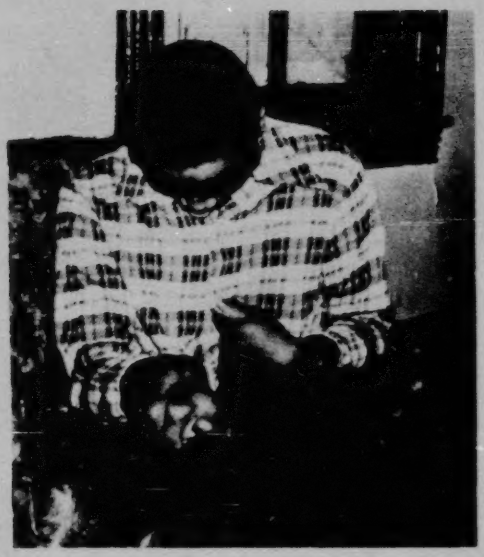
- Invacare
  1200 Taylor Street
  Elyria, Ohio 44035
  (216) 365-9321

- J.A. Preston Corporation
  71 Fifth Avenue
  New York, N.Y. 10003
  Phone: (212) 255-8484

- Lumex, Inc.
  Bayshore, New York
  Phone: (516) 273-2200

## ADAPTIVE DEVICES

### DRESSING

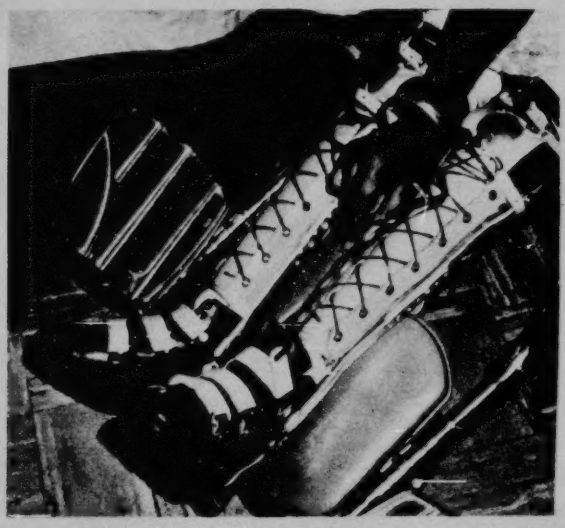


a) VELCRO CLOSURE

Velcro is a pressure sensitive hook and loop tape which can be used as closures for those who cannot manage buttons, hooks, or zippers due to loss of sensation, lack of strength or poor coordination. Various colors.
BK 7578-01-01, Velcro Hook-1":$1.46
BK 7579-01-01, Velcro Loop-1": 1.46
One Yard.

b) LEG STRAP

Strap with velcro closure which fits around the leg and edge of the wheelchair to prevent legs from rubbing against each other.
Cost: under $1.00



c) VELCRO CLOSURE FOR SHOES

Before velcro closure was added, client was unable to fasten her shoes due to limited reach. Velcro is used with D rings.
Cost: about $1.50 for materials

d) VELCRO CLOSURE FOR PANTS

Before Velcro closure was added, client was unable to fasten his pants at the waist band.
50¢ to $1.00 per pair of pants.

e) SOCK DEVICE
Used for those clients who are unable to bend down far enough to slip sock over foot. Sock is placed around a long U-shaped cone with straps. Client holds the straps, drops cone and sock to foot level, inserts toes into opening, then pulls the straps bringing sock over foot and cone slips out. Can be made using X-ray film, leather, or polystyrene sheeting and webbing for about $1.00. The commercial device may be too rigid for some clients.
BK-2086 Flexible Sock Aid $6.00

f) SOCK DEVICE

Commercial sock device at left was used to pull sock over toe and foot but would not go over heel. Student uses this dowel stick with cup hook to pull sock over heel.

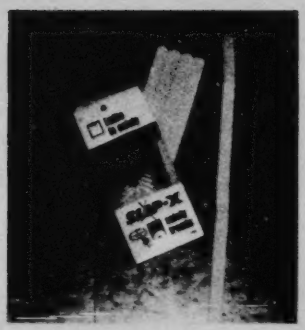
Custom Made Cost: $.50

g) ELASTIC SHOE LACES
Elastic shoe laces are tied in conventional manner and remain tied while foot is slipped in and out of shoe. "Tylastic" is heavy duty and preferable to "Flex-o-lace."
BK-6066 Tylastic Shoe laces=90¢.

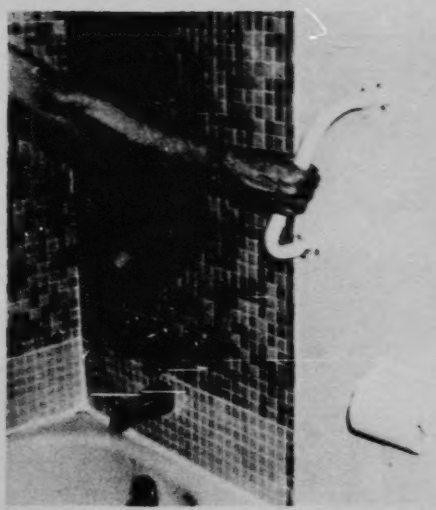
h) COMB ADAPTATION
Comb was rivited to a strip of polypropylene plastic for an extended handle which was heated with a heat gun and bent to a functional contour.
Cost: about $1.00

ASSISTIVE DEVICES

HYGIENE



a) BATH TUB SAFETY STRIPS
Safety strips were placed in the tub to prevent falls or slipping during transfers. The client, however, found them abrasive and they were removed. A rubber suction cup bath mat is preferable.
Safe X-Safety treads:$1.95



b) GRAB BAR FOR BATH
This sturdy metal grab bar was installed using mollies to assure safety in tub transfers for an Ataxic client.
Lumex Grab bar: 12" #4003:$6.70

c) LONG HANDLED BATH SPONGE
Used to reach back and lower extremities for bathing independence. Can be bent with a heat gun for better contour.
BK-6298 Long Scrub Sponge: $1.35

## ASSISTIVE DEVICES

### TRANSFERS

TRANSFER BOARD

This client was unable to transfer by himself. With this light weight plastic transfer board he is able to transfer independently to and from the wheelchair, car, bath tub, and car.

Invacare: $22.00

## ASSISTIVE DEVICES

### EATING

a) ROLLING KNIFE

Pizza cutter knife used for cutting meat by a one handed client or one with poor coordination.

BK-1398-One Hand Roller Knife=$1.75

b) PLATE GUARD

Used with an athetoid cerebral Palsy student to assist in getting food onto his spoon.

BK-1478 Plastic Food Guard - $3.75

c) UNIVERSAL CUFF

A band that fits around the hand with a Velcro closure used for those with weak grasp to hold eating utensils or tooth brush.

BK-1054-Comfort Utensil Holder-medium $1.40 each

d) SUCTION CUP PLATE HOLDER

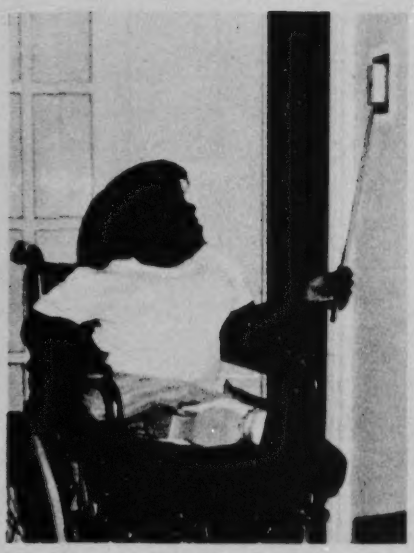
Suction cups are on both sides-used to stabelize the plate for an athetoid cerebral palsy client.

BK-1259-Little Octapus Suction Holder $1.48 each

ADAPTIVE DEVICES

ACCESSIBILITY

a) LOWERED TELEPHONE
This telephone is too high for this muscular dystrophy client to reach and he is unable to replace the receiver. It should be lowered for better convenience.



b) TOT-O-MATIC LIGHT SWITCH
This device enables a person with limited reach to turn the lights on and off. It is no longer available commercially and must be custom made.
Materials about $1.50.

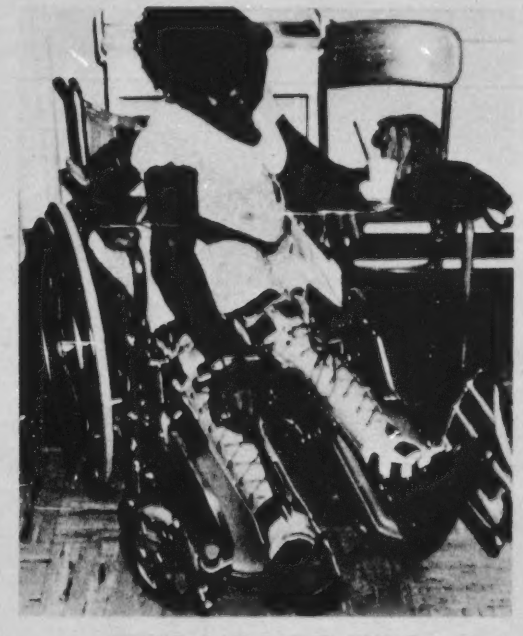
c) DOOR KNOB EXTENSION
Used with clients with limited grasp or who lack supination and pronation. It snaps over the door knob and gives leverage to turn the knob.
BK-6393 Door Knob Extension:$1.25

d) JAR OPENER
To assist a client with weak grasp to open jars.
BK-3086 Zim Jar Lid Opener
$3.40

## REACHERS

a) PLEXIGLAS REACHER
Lightest weight reacher - used for muscular dystrophy clients who lack strength to lift conventional reacher. The end of a plexiglas straw is heated with a heat gun and a hook is inserted. Made with following materials:
BK-1133 Flexible Plastic Straw (10)$1.32
Hooks - package of 6 .49
$1.71

b) DOWEL STICK REACHER
Dowel stick with cup hook in one end and closet hook in other end, used especially to remove clothes from the closet for those with limited reach or for the wheelchair bound.
Cost to make about 60¢
BK-2109 Economy Reacher & Dressing Stick - $1.50



c) METAL BAR-B-QUE TONGS
Used to extend reach and grasp. The Fairgrove brand has serrated edges which are preferable to rounded edges. Gadget section in Housewares of department stores.
Fairgrove - Manufacturer - $1.24

d) WOODEN REACHER
27" scissor-type reacher with magnet. This reacher may be too heavy for some with loss of strength and is best used with two hands - can be used with one hand.
BK-6105= Better Grip Wooden Reacher= $6.98

## ASSISTIVE DEVICES

### REACHERS

e) PISTOL TYPE REACHER
27" aluminum, 7 oz. one handed pistol trigger action reacher with jaws that open about 2". It has a magnet and a projection for pulling things.
BK-6109 Helping Hand Reacher
$16.00

f) GRAB ALL REACHER
30" metal reacher with wide jaws, best for large objects (cans, cerials, etc.). Can be used one handed but requires normal grasp.
BK-6438 - Grab All Reacher=$5.75.

## ASSISTIVE DEVICES

### TRANSPORTING OBJECTS

a) WHEELCHAIR CADDIE
Plastic box attached to wheelchair to carry objects and drinks. Interfers with manipulation of wheelchair, easily broken.
Everest & Jennings:
$9.95

b) CRUTCH BAG
Canvas bag attached to crutch by webbing straps. Opens to 3" thickness. Allows person to carry books and other objects.
Preston:PC-7378
Utility Crutch Bag:$8.30

c) SHOULDER BAG
Used to carry items by those clients who use crutches.
Levi: $6.00
Others: $3.00 and up.

## B. RECREATION

Student interests along with the therapeutic value of recreational activities were considered in selecting the following recreational programs (Items 1 through 4) for implementation at the Sharpe Health School.

1) After-School Music Program

Ten students participated in an after-school music program that met for one hour each week. The major components of this program included: learning how to read music, instruction in playing musical and rhythm instruments, singing, and music appreciation. The weekly lesson plans that were used are listed in Appendix H.

The recreation therapist and a music therapist (working as a consultant) evaluated the students in the areas of physical functions, motivation, socialization, education, and recreation. The components of each of the five major areas evaluated are as follows:

Physical Functions

a) Develop basic movement of walking
b) Coordinating and rhythmically using parts of the body to strong rhythm beats
c) Grasping and handling of rhythm instruments with controlled use of fingers, hands, wrist, and arms
d) Maintaining the use of line motor coordination by transferring them to more difficult instruments demanding additional control; i.e., piano, guitar, and coronet

Motivation

a) Attendance at the after-school music program
b) Improvement and increase of attention span
c) Participation at a group level--playing rhythm instruments with the group when the music begins and stopping when the music stops
d) Participation at an individual level, assisting in mechanics of music program to help maintain smoothness and efficiency
e) Taking the initiative in leading others in chorus and rhythm band
f) Showing initiative in helping plan and implement the music program
g) Persistence in practicing and learning songs for performance

Socialization

a) Group interaction among students
b) Social interaction between students and staff

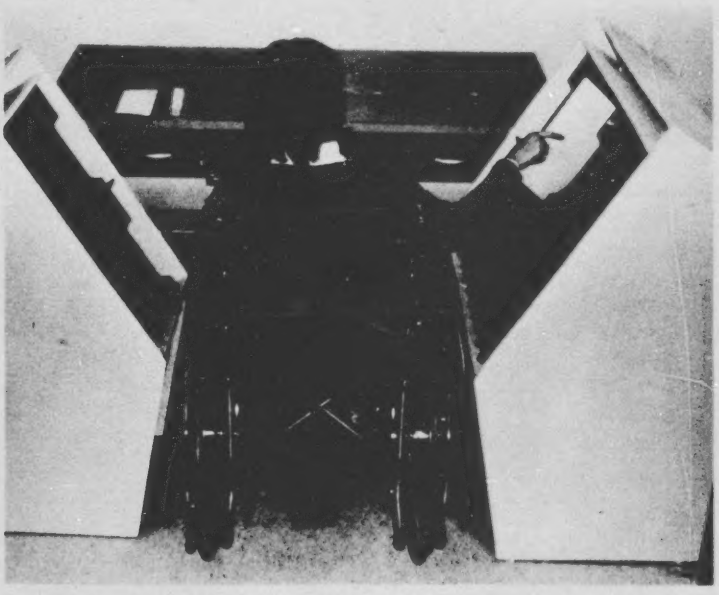
Educational

a) Learning how to read music and transferring this knowledge to more complex instruments; i.e., guitar, piano, coronet, recorder





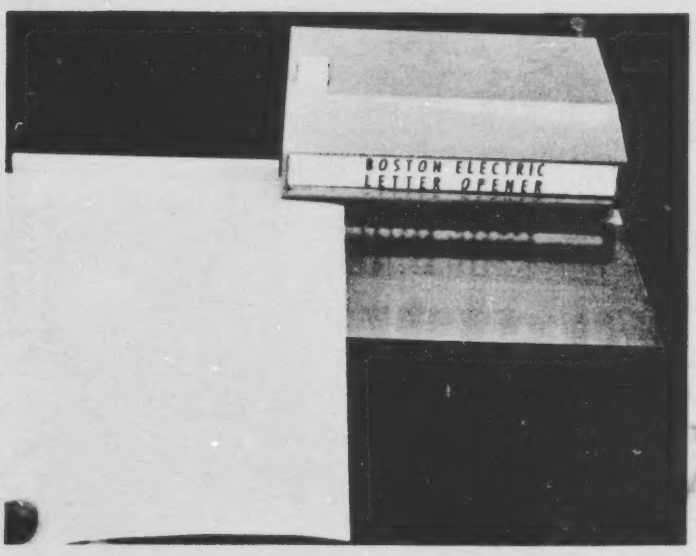
3) An electric letter opener was deemed necessary as C.F.'s speed in opening letters using a letter opener along with a universal cuff was too slow.



(A secretary of the Job Development Laboratory is demonstrating the feasibility of using such devices for the non-handicapped population.)

MAIL SORTER

Materials: wood, masonite, Laytex paint Cost of materials: $75.00




BOSTON ELECTRIC LETTER OPENER

Cost: $49.95

ACCO STANDARD ELECTRIC STAPLER

Cost: $39.95

b) Understanding the concept of rhythm and transferring concept to instrument
c) Improving comprehension of instruction
d) Learning the history and usage of rhythm instruments
e) Giving creative interpretations of recorded music
f) Recognizing different concepts of music; i.e., rhythm melody, harmony, tempo, dynamics, and forms
g) Ability to play music by ear
h) Learning to play or sing a song from memory
i) Music appreciation of different styles of music

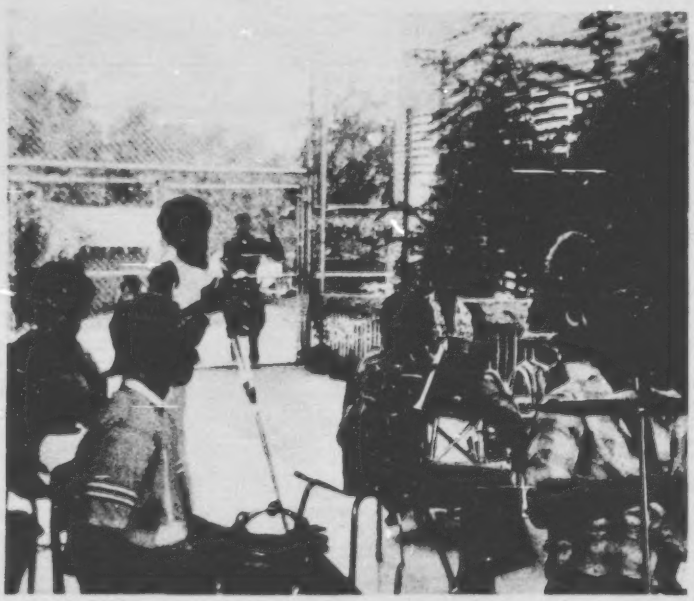
Recreation

a) Relaxation during program
b) Enjoyment, pleasure, and fun of listening to music
c) Providing an outlet and opportunity for release of emotions
d) Enjoyment of singing
e) Enjoyment of playing and making one's own music--improvisation
f) Satisfaction of performing music for others

An evaluation on each student was done weekly by the music consultant and the recreational therapist. The students were rated on a scale from 1-5 with 5 being excellent, 4-good, 3-average, 2-fair, and 1-poor.

Emphasis was placed on different specific goals for each student. The ratings each student receiving each week in a major area were determined by taking the average of the ratings given to the student in the specific goals of the major area that the student worked on for that session.

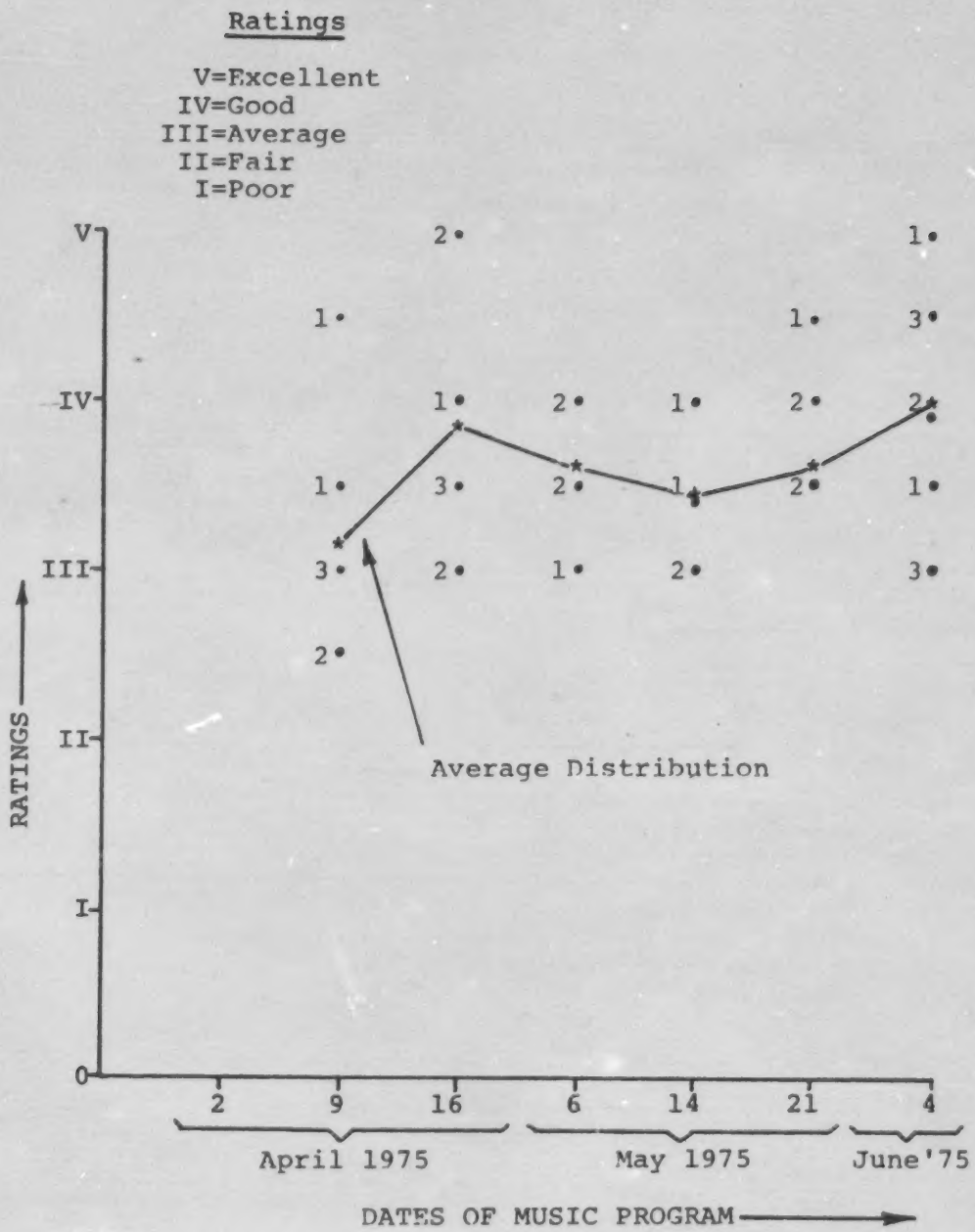
The following graphs represent the increase in performance of the 10 students over the seven week period that the program was operational.



STUDENTS PARTICIPATING IN MUSIC PROGRAM

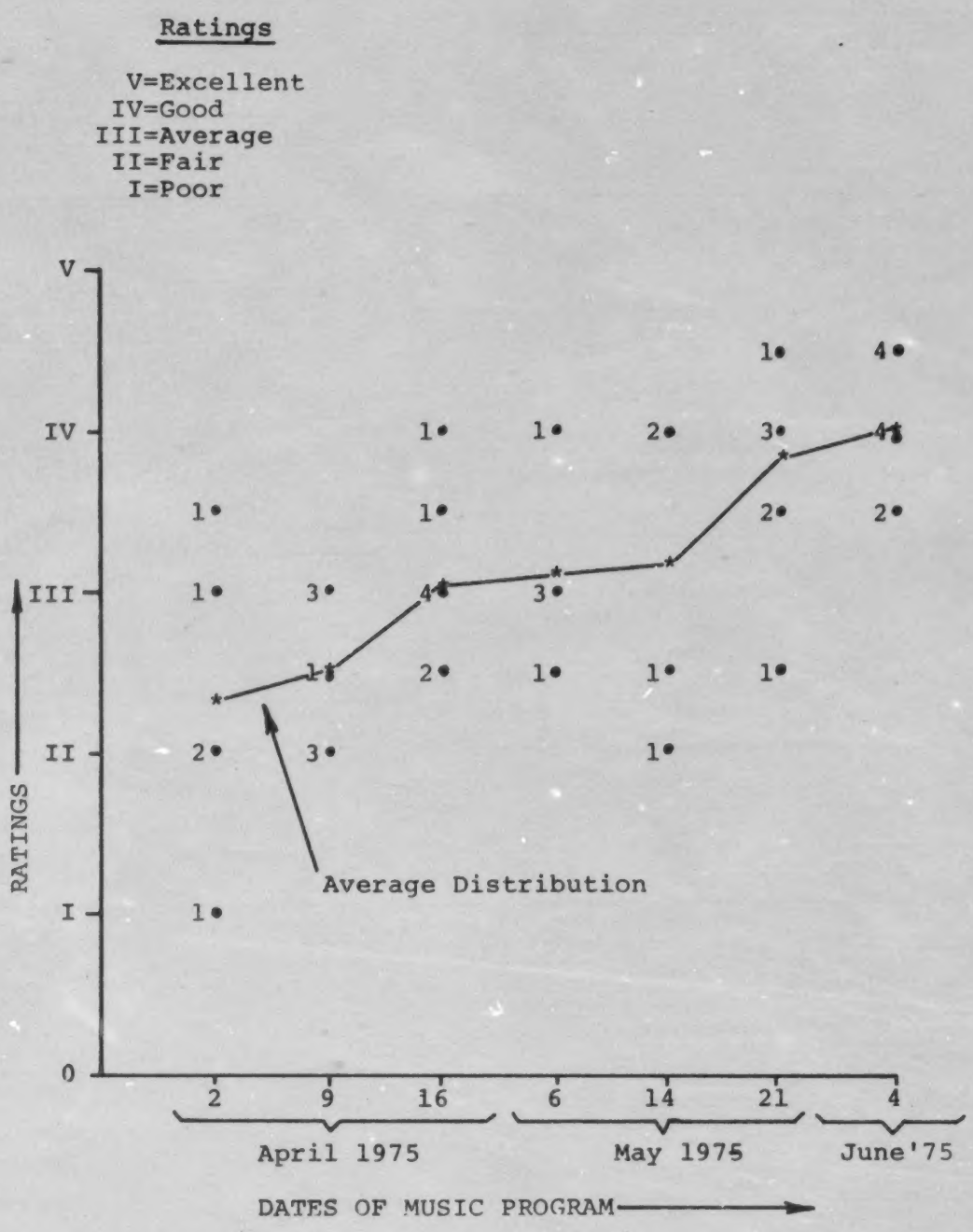
GRAPH 1.

PHYSICAL FUNCTION PROGRESS RATINGS GRAPHED BY NUMBERS OF STUDENTS IN ATTENDANCE ON EACH DATE THAT MUSIC PROGRAM WAS IN SESSION



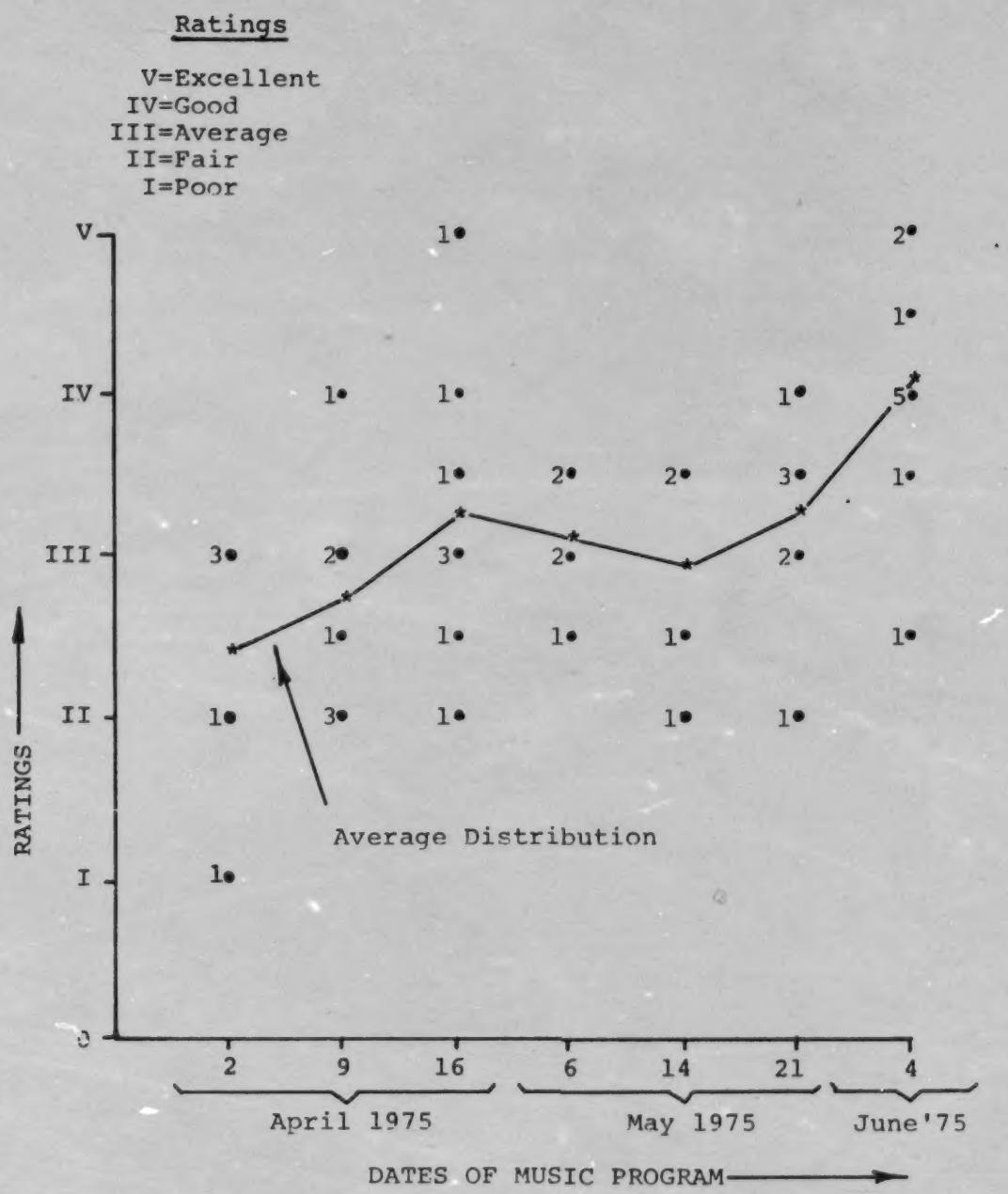
GRAPH 2.

MOTIVATION PROGRESS RATINGS GRAPHED BY NUMBERS OF STUDENTS IN ATTENDANCE ON EACH DATE THAT MUSIC PROGRAM WAS IN SESSION



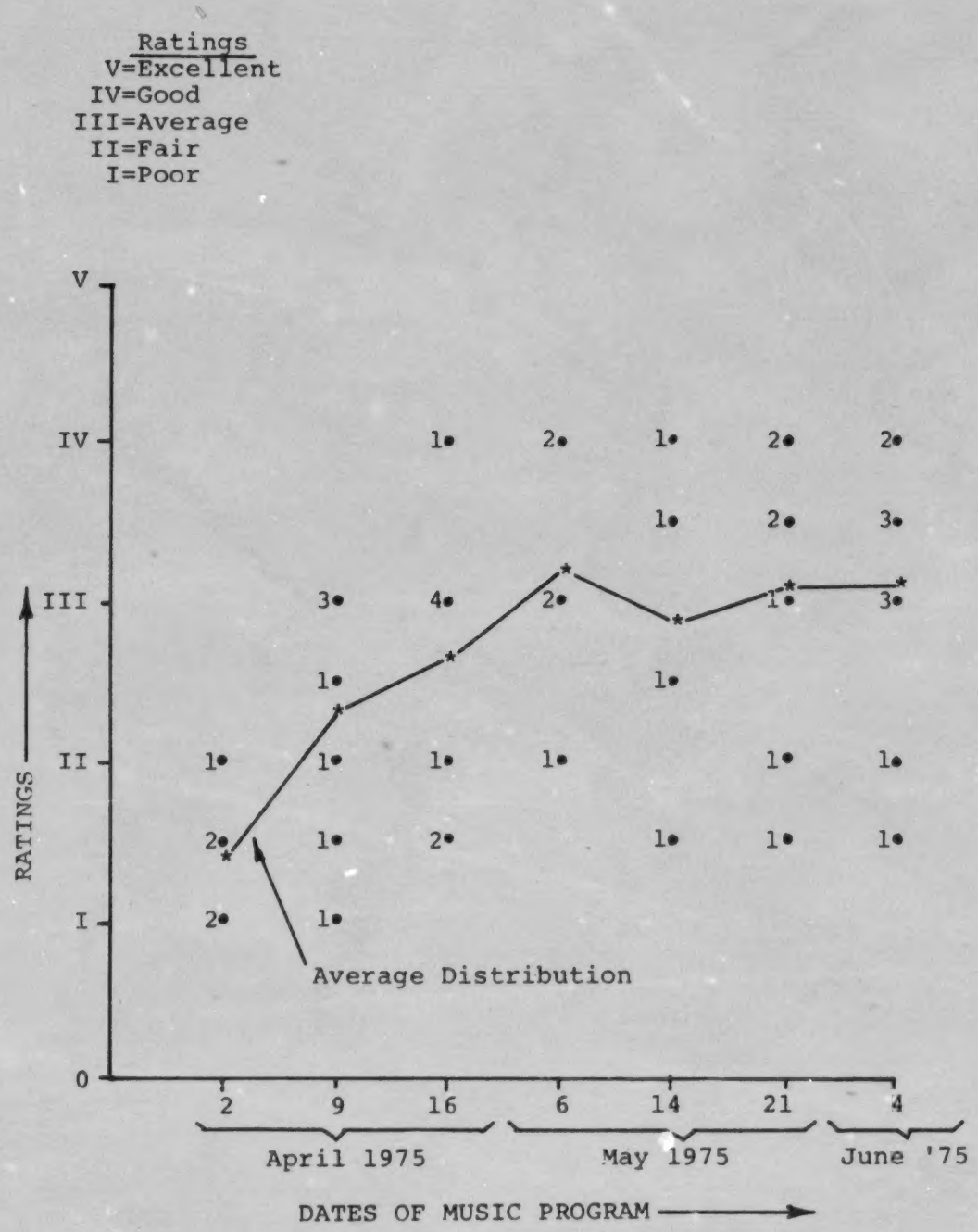
GRAPH 3.

SOCIALIZATION PROGRESS RATINGS GRAPHED BY NUMBERS OF STUDENTS IN ATTENDANCE ON EACH DATE THAT MUSIC PROGRAM WAS IN SESSION



GRAPH 4.

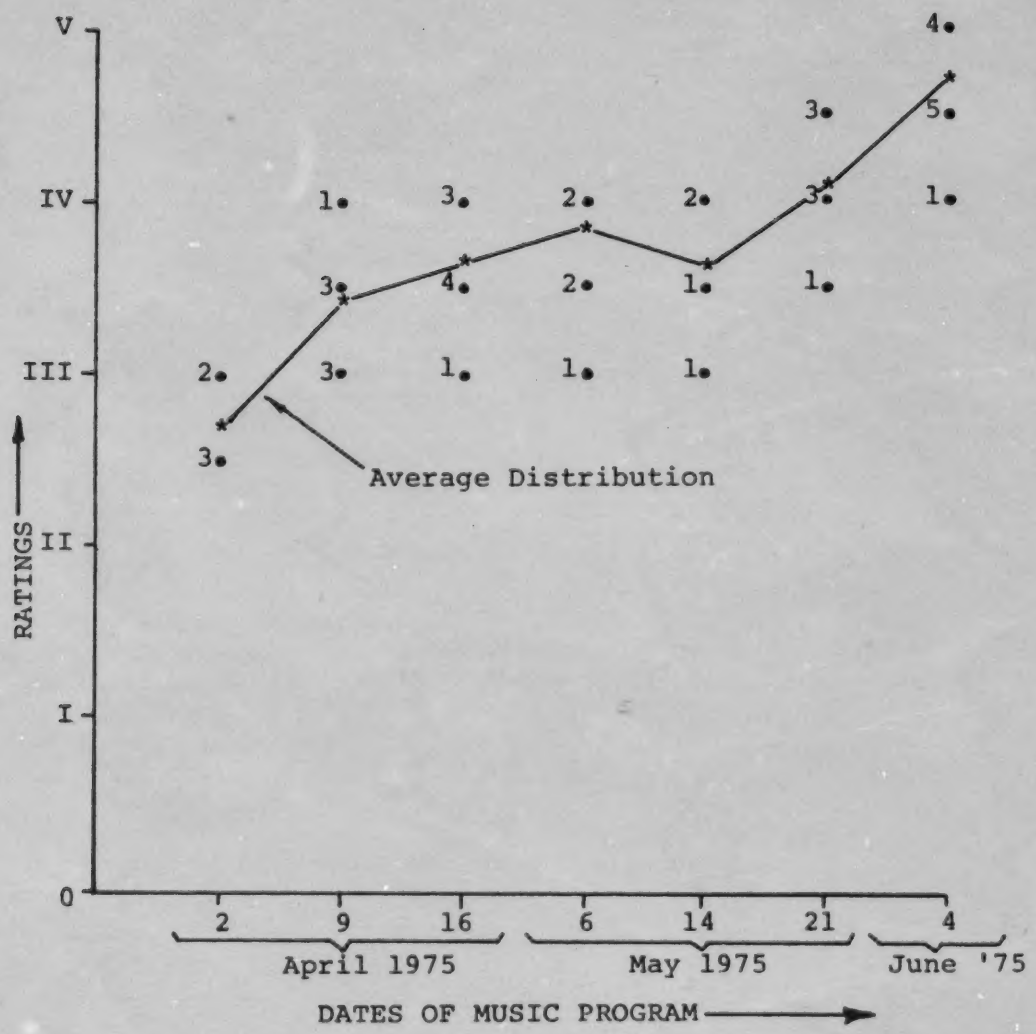
EDUCATION PROGRESS RATINGS GRAPHED BY NUMBERS OF STUDENTS IN ATTENDANCE ON EACH DATE THAT MUSIC PROGRAM WAS IN SESSION



GRAPH 5.

RECREATION PROGRESS RATINGS GRAPHED BY NUMBERS OF STUDENTS IN ATTENDANCE ON EACH DATE THAT MUSIC PROGRAM WAS IN SESSION.

Ratings
V=Excellent
IV=Good
III=Average
II=Fair
I=Poor



2) Leisure Counseling

In providing leisure services to the students through counseling, the recreational therapist's goals were to:

a) Acquaint the student to a variety of leisure possibilities in the community in which he lives
b) Help the student make appropriate choices from among the possibilities
c) Help them devise and follow a leisure plan

The objective was to help the handicapped student adjust to and become part of his environment in a way that would be rewarding and satisfying.

The first task was to assess the leisure needs and interests of the individual. The level of functioning with regard to the students use of leisure time was assessed by asking each individual, "What do you do in your leisure time?" and by having each student list likes or dislikes on an inventory checklist (see Appendix F). After reviewing this information, the students were asked, "If you were given the necessary resources, what would you most like to do in your leisure time?"

A "real" and "ideal" leisure profile was established for each student whose response to this question differed greatly from his actual use of leisure time. The "real" being what the individual actually does with his leisure time and the "ideal" being what he would like to do with this time.

Bridging the gap between the real and the ideal was the second task. In accomplishing this, information was collected about leisure resources in the community and in the immediate area to identify: major public and private recreational agencies and their geographic location, the recreation professionals operating the programs and facilities, and the communication routes between the recreation agencies' staffs and the activities division program for handling referrals. Program schedules and the location of programs were also determined. A file card system was developed, and is still being added to, listing agencies, contact persons, programs, and pertinent information needed for referral and/or use.

The above mentioned information can be obtained by sending a questionnaire out to possible leisure activity resources. A suggested questionnaire is included in Appendix I.

Once the resource file was established, recommendations of suitable types of programs available in the community were provided to the student. In making these recommendations, the recreational therapist did not only focus on the advised or selected activity, but also on the feasibility of the activity.

Variables of feasibility included the following:

a) social
b) financial resources
c) physical and mental abilities
d) accessibility
e) related background experiences

Presently, transportation problems have hindered students in availing themselves of community-based programs. When an adequate solution to this problem is worked out, the recreational therapist will make initial contacts for the students and do a follow-up on every individual referred to a community program.

If the program is found to be unsatisfactory, further attempts will be made to assist the individual in finding a more suitable program based on his interests, needs, and goals.

Once interest and motivation is established, the student will be encouraged to participate in leisure activities on his own.

3) Miniature Golf Course

Plans are being made for a portable three-hole miniature golf course. One unit has been given to the school to evaluate its accessibility and durability. The course is designed to be used by all multiply handicapped students. After the initial evaluation, holes 2 and 3 will be constructed. Specifications and material costs of the completed first hole are listed on page 20.

Game values will include strengthening self-concepts and self-image, improving standing tolerance, eye-ball contact, single response activity, follow through, joint range of exercising, fine and gross motor development, socialization, relaxation, and fun.

4) Adaptations and Modifications

Many of the adaptations and modifications which were originally designed to enable students to overcome problems of coordination and to increase functional independence have also increased recreational opportunities for the students. Examples of such adaptations include:

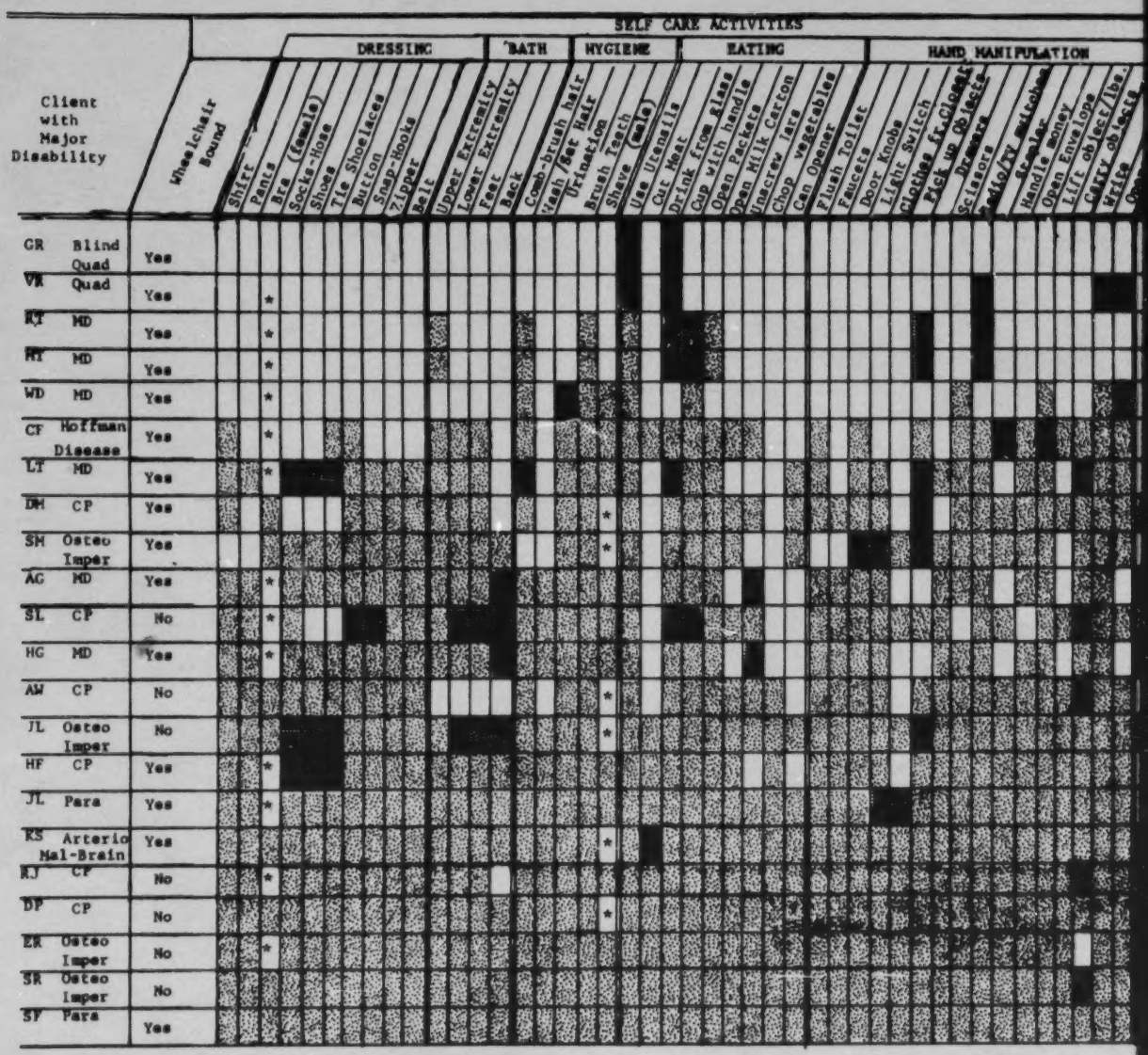
a) Changing of knobs on record player controls (page 8)
b) Detachable switches on tape recorder (page 10)
c) Building of a work table (page 11)
d) Adapting mouthstick for stereo operation (page 14)
d) Adapting leaves to card readers (page 10)
f) Adapting a microfilm reader in the library at Sharpe Health School

## C. FUNCTIONAL MEASUREMENTS

Students were initially evaluated for independence in fifty areas of self-care by the staff (occupational therapist). The gain of independence in self-care, after application of bio-engineering techniques, is indicated in Charts 2 and 3.

Chart 2

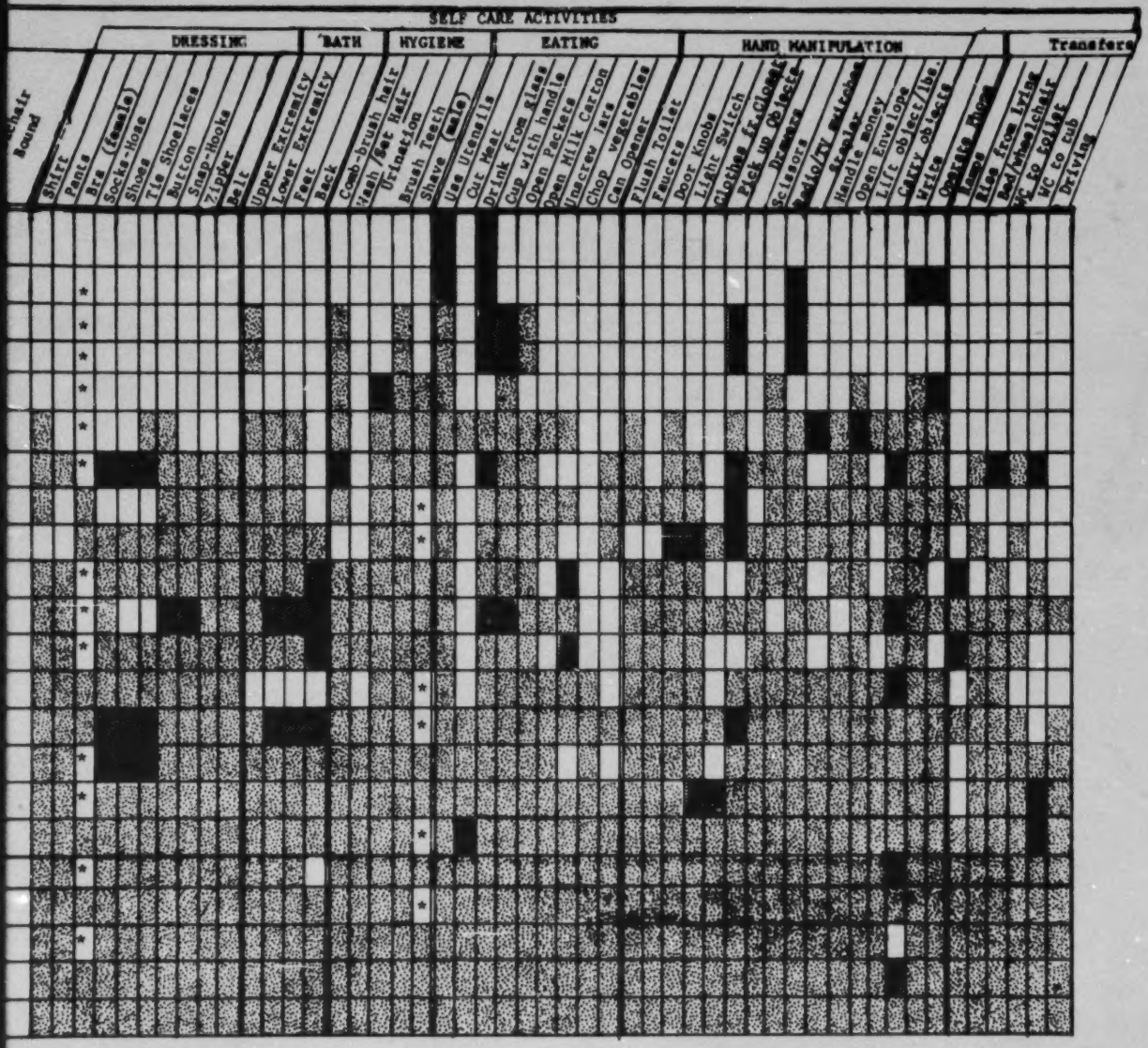
USE OF ADAPTIVE DEVICES TO INCREASE INDEPENDENCE IN SELF CA




Legend:

- Independent Before Adaptations
- Independent After Adaptations
- Independence Still Lacking
- * Not Applicable

USE OF ADAPTIVE DEVICES TO INCREASE INDEPENDENCE IN SELF CARE

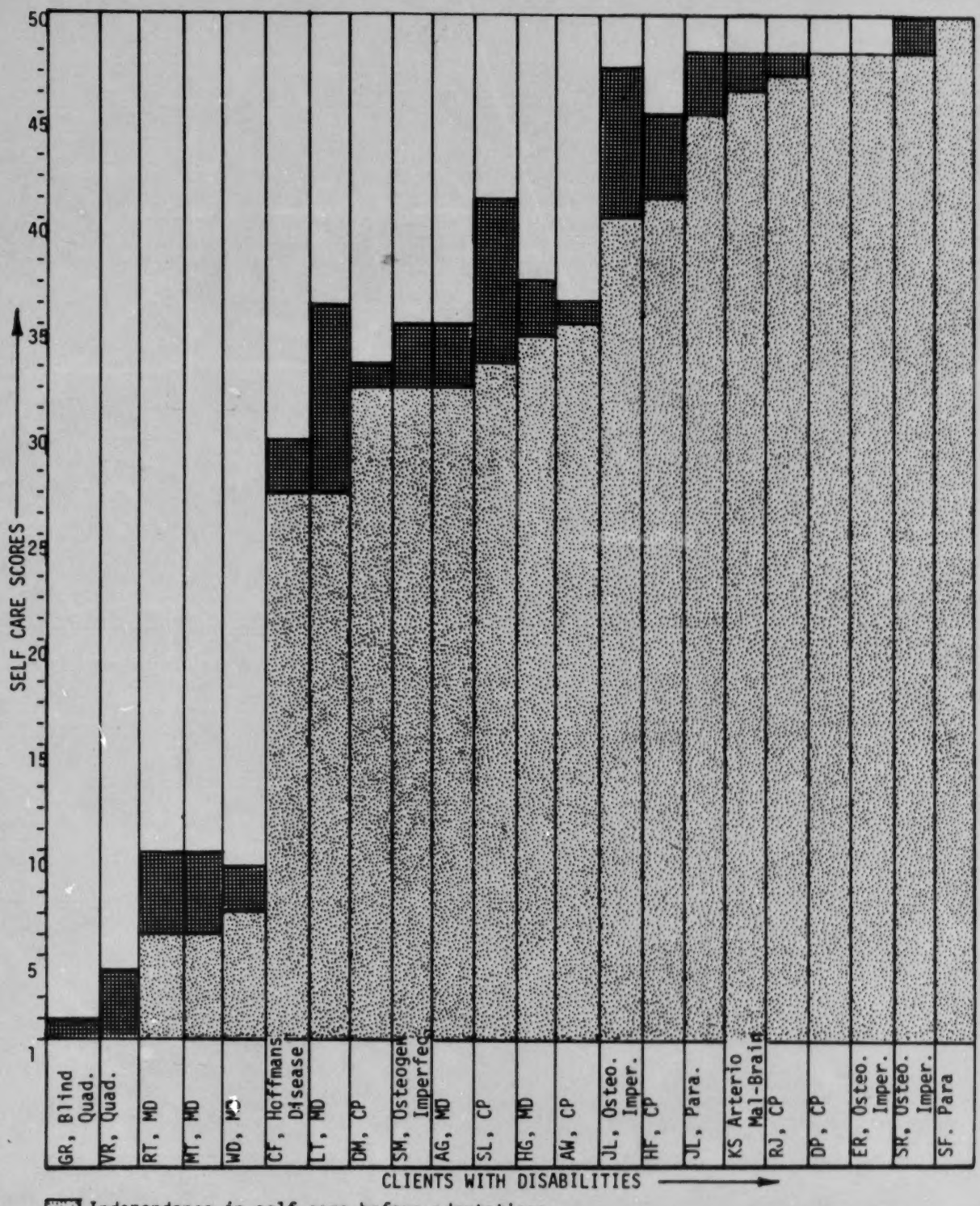



Independent Before Adaptations
Independent After Adaptations
Independence Still Lacking
Not Applicable

48A

Chart 3

INCREASED INDEPENDENCE DUE TO UTILIZATION OF ADAPTIVE DEVICES



## D. VOCATIONAL ORIENTATION

The concepts of positive attitude toward vocational potential were introduced to the project students at the October orientation meeting at the Sharpe Health School.

### 1) National College Fair

On December 11, 1974, a National College Fair was held at the Sheraton-Park Hotel in Washington, D.C. Counselors from approximately 350 colleges were on hand to disseminate information about course offerings, tuitions, and living expenditures at their respective institutions. Ten students of the Sharpe Health School were taken to the Fair by Sharpe School and project staff to expose the students to the academic world and its offerings. The students attending the Fair related that they had gained helpful information in spite of the fact that large crowds and structural barriers limited the accessibility to all of the college booths.

### 2) Microfilming

Eight students and a school staff member were selected and received pre-vocational training in microfilming skills at Sharpe Health School. Participants were first oriented to the world of micrographics, its terminology, and its vocational potential for the severely physically disabled by project staff at a meeting held on April 10, 1975 at Sharpe Health School. A self-learning package consisting of slides and a cassette audio tape was developed at the Job Development Laboratory. A microfilm camera and viewer were also provided to complete training. Books selected by the school staff were microfilmed by the students as part of their training. The purpose was twofold: (1) specific training in a marketable skill for severely disabled people, (2) greater access to books for visually impaired students, and students unable to turn pages, through use of an adapted microfilm viewer.

### 3) One-Hand Typing

In the course of developing jobs for disabled workers, many openings for clerk-typists are found. Certain students at Sharpe Health School who have use of only one hand could be trained as effective typists using a one-hand typewriter developed by the Typewriting Institute for the Handicapped in Phoenix, Arizona. The typing teacher at Sharpe Health School has been provided with such a typewriter by project staff for evaluation. Plans are being made at Sharpe to incorporate a training program utilizing this typewriter.

### 4) Summer Employment

Eight students(project participants) have been placed in clerical positions as part of a Federally funded youth summer employment program. Project staff are presently doing a job analysis of each work site to determine the exact requirements of the job as well as the accessibility of the work environment. A job analysis form, developed at the Job Development Laboratory, is being utilized in evaluating each work site (see Appendix J). The students' functional ability and the job analysis will form a basis for implementing bio-engineering techniques, if necessary, that will increase the productivity and the range of activities the students can perform on the job.

Summer employment will benefit students by providing an introduction to the world of work, work experience for a resume, and a valuable socialization experience in a non-protective environment.

## E. EVALUATION OF FUNCTIONAL AND VOCATIONAL POTENTIAL

Using the functional activity file developed for each student, the project staff evaluates what modifications can be recommended and what specific adaptations can be devised. They then suggest specific devices and techniques to solve the problem of a particular student who is being evaluated.

Recommendations for each individual are based on an approach which combines modification of the environment and adaptive devices for the individual. In all instances, a cost-effective approach is the determinant in the selection of environmental and orthotic adaptations for each student.

The following example demonstrates how bio-engineering services enhanced the productivity of a former Sharpe Health School student. As a result of this, the student is now gainfully employed as a mail clerk at the Department of Justice.

### EXAMPLE

C.F. is a personable,20 year old, black client who was born with Werdnig-Hoffman's Disease of muscular atrophy. He is functionally a quadriplegic and is confined to an electric wheelchair. His upper extremity functions are very limited and marked by weakness, although he has limited pinch and grasp which enables him to perform some desk activities.

Since 1973, he has been homebound without any meaningful activity. He has expressed a great desire to work and to be able to get out of his house so that he could interact with people. Initially, it was not considered feasible for him to be able to commute to work as transportation costs for vehicles with a ramp are prohibitive ($24 to $40 per round trip).

Due to cooperation by special consent from the Director of United Cerebral Palsy, the Job Development Laboratory was able to solve the transportation problem. United Cerebral Palsy allowed the organization's van to transport him to and from work for a fee of $25 per week.

With the transportation problem solved, a job was secured with the Department of Justice for C.F. to become a mail clerk. The job analysis revealed that C.F. could perform the job tasks if job site adaptations were made. The job functions include opening envelopes, stamping the contents, reading the letters, stapling when necessary, and distributing the mail into appropriate files.

Many simple changes were made to enable C.F. to be productive:

1) A height-adjustable table 2' x 5' was purchased to allow close wheelchair access at the height of 26 inches

2) A tray adjusted to be 10 inches in height from the floor was placed to his left for the mail to be deposited for easy access. To facilitate easy sorting of mail by a wheelchair-bound clerk, mail sorters were designed according to ideal height and angle. The sorters are arranged with a 24-slot bank on the right of the chair and a 12-slot unit on the left. The slot design provides convenience of sorting mail by the clerk as well as easy removal of sorted mail by others.

## F. MEETINGS

1) Board of Advisors Meeting

Advisors and consultants to the project were informed of staff activities and achievements during the first half of the project at a meeting held at The George Washington University on March 5, 1975 (Appendix K).

A general discussion of the project staff's future plans as well as recommendations from advisors and consultants followed this report.

2) Staff, Parent, and Student Meetings

The staff of Sharpe Health School, student project participants, and their parents were oriented to project achievments and future areas of concern at meetings held on March 19, 1975 and March 26, 1975 at Sharpe Health School (Appendices L,M). Involvement of staff, students, and parents at these meetings has increased motivation and cooperation of all concerned in achieving the project goals.

3) Board of Advisors Meeting

A Board of Advisors Meeting was held at The George Washington University on June 10, 1975. At this time, a tentative outline for the program to be used at a national workshop to disseminate project results was discussed. Participants of this meeting are listed in Appendix N.

PHASE III (6/1/75 - 8/30/75)

## WORKSHOP AND FINAL REPORT

A practical workshop will be held in December of 1975 to demonstrate how low-cost, simply designed, bio-engineering adaptations can be used to increase functional level and work capacity. Audiovisual materials will be utilized at this workshop and will be made available to interested agencies and community organizations to be used as models in program planning for disabled persons on a locals, state, and national level.

Present plans are to invite staff members from Rehabilitation Services Administration (RSA), vocational rehabilitation facilities, and schools for handicapped children in Region III (Washington, D.C.; Maryland; Virginia; Delaware; and Pennsylvania), Research and Training Centers (R & T Centers), and University Affiliated Facilities (UAF) funded under RSA to this workshop.

This final report, which contains the compilation of all project results, will be utilized as the primary resource material for the workshop. Copies of this report are available to all professionals working with developmentally disabled populations and can be obtained by writing to:

K. Mallik, Director
Job Development Laboratory
The George Washington University
Medical Center
2300 Eye Street, N.W., Room 420
Washington, D.C. 20037
(202) 331-6847

APPENDIX


A. General Description of the Sharpe Health School students chosen to participate in the project . . . . . 50

B. Agenda: Parent Orientation, October 2, 1974 . . . . . 53

C. Letter sent to parents not in attendance at Oct. 2, 1974 meeting . 54

D. Form: Functional Evaluation of Physically Disabled . . . . . 55

E. Example: Architectural Barriers . . . . . 59

F. Form: Recreational Interests . . . . . 60

G. Example: Psychological measurements of Sharpe Health School students . . . . . 62

H. Music Program Lesson Plans . . . . . 64

I. Recreational Resource File Questionnaire . . . . . 66

J. Job Development Laboratory, Job Analysis Form . . . . . 68

K. March 5, 1975 Board of Advisors Meeting: List of Participants and Agenda . . . . . 69

L. March 19, 1975 Sharpe Health School Staff Orientation Meeting . . 71

M. March 26, 1975 Sharpe Health School Parent and Student Orientation Meeting . . . . . 72

N. Second Board of Advisors Meeting, June 10, 1975: List of Participants . . . . . 73

## GENERAL DESCRIPTION OF SHARPE HEALTH SCHOOL STUDENTS

| STUDENT | AGE | GRADE | DISABILITY | MOBILITY | GENE |
|---|---|---|---|---|---|
| H.F. | 19-3 | 11 | C.P. Spastic Quadriplegia | Wheelchair dependent Can propel wheelchair with lower extremities | Has li functi munica |
| S.L. | 19-11 | 11 | Cerebral Palsy Athetoid | Ambulatory (severe athetoid movements) | Lt. up tional adapte writte indepe dressi ity no |
| W.M. | 16-6 | 11 | Spina Bifida | Can ambulate with braces and crutches. | Upper |
| A.G. | 17-6 | 11 | Muscular Dystrophy | Wheelchair (full-time) Limited ability to propel chair. | Marked ities; depend munica |
| L.T. | 16-5 | 11 | Muscular Dystrophy | Wheelchair (full-time) | Marked ities; depend munica |
| H.G. | 18-7 | 12 | Muscular Dystrophy | Wheelchair (full-time) Can propel wheelchair on smooth surface. | Weakne has fi in eat |
| K.S. | 18-10 | 12 | Arterio-venous malformation in brain | Wheelchair (full-time) | Upper rt. ha fair. dress |

Appendix A

## GENERAL DESCRIPTION OF SHARPE HEALTH SCHOOL STUDENTS

| GRADE | DISABILITY | MOBILITY | GENERAL FUNCTIONING |
|---|---|---|---|
| 11 | C.P. Spastic Quadriplegia | Wheelchair dependent Can propel wheelchair with lower extremities | Has limitation of upper extremity function; is independent in communication and eating skills |
| 11 | Cerebral Palsy Athetoid | Ambulatory (severe athetoid movements) | Lt. upper extremity, barely functional, can sign name only; uses adapted electric typewriter for written communication; essentially independent in eating and in dressing skills; rt. upper extremity non-functional. |
| 11 | Spina Bifida | Can ambulate with braces and crutches. | Upper extremities normal. |
| 11 | Muscular Dystrophy | Wheelchair (full-time) Limited ability to propel chair. | Marked weakness of upper extremities; has fine hand skills; independent in eatin and in communication skills. |
| 11 | Muscular Dystrophy | Wheelchair (full-time) | Marked weakness of upper extremities; has fine hand skills; independent in eating and in communication skills. |
| 12 | Muscular Dystrophy | Wheelchair (full-time) Can propel wheelchair on smooth surface. | Weakness of upper extremities; has fine hand skills; independent in eating and communication. |
| 12 | Arterio-venous malformation in brain | Wheelchair (full-time) | Upper extremity coordination fair: rt. hand use good. Lt. hand use fair. Independent in eating, dressing, and communication skills |

| STUDENT | AGE | GRADE | DISABILITY | MOBILITY | GENE |
|---|---|---|---|---|---|
| A.W. | 17-6 | 7 | Cerebral Palsy Spastic Paraplegia | Long -leg braces & crutches. Independent in ambulation and elevation with equipment (low endurance on stairs) | Norm |
| R.J. | 16-7 | 9 | Cerebral Palsy Spastic Paraplegia | Long-leg braces and crutches; ambulatory but needs some assistance in elevating activities. | Has |
| D.M. | 18-10 | 9 | Cerebral Palsy | Wheelchair | Very |
| S.M. | 17 | 10 | Osteogenesis Imperfecta | Wheelchair | Some |
| E.R. | 17-3 | 9 | Osteogenesis Imperfecta | Wheelchair | Good |
| S.F. | 15-4 | 9 | Traumatic Paraplegia | Wheelchair (sometimes uses crutches) | Good |
| W.D. | 19-4 | Grad. | Muscular Dystrophy | Wheelchair | Very |
| M.T. | 21 | Grad. | Muscular Dystrophy | Wheelchair | Very |
| R.T. | 19-10 | Grad. | Muscular Dystrophy | Wheelchair | Very |
| C.F. | 19-4 | Grad. | Hoffman's Disease | Wheelchair | Some |
| J.L. | 19-11 | 12 (transferred to Woodson High) | Traumatic Paraplegia | Wheelchair | Exce |
| D.H. | 15-7 | 10 | Osteogenesis Imperfecta | Wheelchair (sometimes walks on crutches) | Norm |
| J.L. | 18 | 10 | Osteogenesis Imperfecta | Wheelchair (sometimes walks on crutches) | Norm |

| GRADE | DISABILITY | MOBILITY | GENERAL FUNCTIONING |
|---|---|---|---|
| 7 | Cerebral Palsy Spastic Paraplegia | Long -leg braces & crutches. Independent in ambulation and elevation with equipment (low endurance on stairs) | Normal upper extremities. |
| 9 | Cerebral Palsy Spastic Paraplegia | Long-leg braces and crutches; ambulatory but needs some assistance in elevating activities. | Has good upper extremities. |
| 9 | Cerebral Palsy | Wheelchair | Very limited. |
| 10 | Osteogenesis Imperfecta | Wheelchair | Some limitation. |
| 9 | Osteogenesis Imperfecta | Wheelchair | Good |
| 9 | Traumatic Paraplegia | Wheelchair (sometimes uses crutches) | Good |
| Grad. | Muscular Dystrophy | Wheelchair | Very limited. |
| Grad. | Muscular Dystrophy | Wheelchair | Very limited |
| Grad. | Muscular Dystrophy | Wheelchair | Very limited |
| Grad. | Hoffman's Disease | Wheelchair | Some limitations. |
| 12 (transferred to Woodson High) | Traumatic Paraplegia | Wheelchair | Excellent. |
| 10 | Osteogenesis Imperfecta | Wheelchair (sometimes walks on crutches) | Normal upper extremities. |
| 10 | Osteogenesis Imperfecta | Wheelchair (sometimes walks on crutches) | Normal upper extremities. |

| STUDENT | AGE | GRADE | DISABILITY | MOBILITY | GENERAL |
|---|---|---|---|---|---|
| S.R. | 16 | 9 | Osteogenesis Imperfecta | Long-leg braces and crutches | Normal u |
| D.P. | 18-6 | 8 | C.P. Tension Athetoid | Long-leg braces and crutches | Good u |
| V.R. | 17-2 | 11 | Qualdriplegic | Mouth control--electric wheelchair | Very lim |
| G. R. | 12 | 5 | Blind Quadriplegia | Wheelchair Dependent--unable to propel chair himself | Very limi in finger |
| L.B. | 9 | Profoundly Retarded Program | C.P. Quadriplegic Mentally Retarded | Wheelchair Dependant--unable to propel chair herself | Very limi |

| GRADE | DISABILITY | MOBILITY | GENERAL FUNCTIONING |
|---|---|---|---|
| 9 | Osteogenesis Imperfecta | Long-leg braces and crutches | Normal upper extremities. |
| 8 | C.P. Tension Athetoid | Long-leg braces and crutches | Good upper extremities. |
| 11 | Qualdriplegic | Mouth control--electric wheelchair | Very limited. |
| 5 | Blind Quadriplegia | Wheelchair Dependent--unable to propel chair himself | Very limited; no sensation in finger tips |
| Profoundly Retarded Program | C.P. Quadriplegic Mentally Retarded | Wheelchair Dependant--unable to propel chair herself | Very limited |

PARENT ORIENTATION

BIO-ENGINEERING SERVICES TO DEVELOPMENTALLY
DISABLED ADOLESCENTS

The George Washington University Medical Center
Job Development Lab
and
Sharpe Health School

October 2, 1974

| | |
|---|---|
| 9:20 - 9:30 | INTRODUCTION: Mrs. Marian Siler, Principal |
| 9:30 - 9:50 | MOVIE: The World of Work for the Severely Disabled |
| 9:50 - 10:00 | ORIENTATION: Kalisankar Mallik, Director; Medical and Systems Engineer |
| 10:00 - 10:15 | FUNCTIONING IN DAILY ACTIVITIES: Evelyn Smith, Project Coordinator, Registered Occupational Therapist, M.Ed. in Special Education<br><br>Questions and Answers |
| 10:15 - 10:30 | VOCATIONAL GUIDANCE: Ruth Sablowsky, Vocational Coordinator, M.Ed. in Rehab. Counseling |
| 10:30 - 10:45 | INSTRUCTION AND TRAINING: Pei-hwa Kung Foo, Instruction and Training Supervisor, M.S. in Education |
| 10:45 - 11:00 | RECREATION: Cindy Walker, Recreational Therapist<br><br>Questions and Answers |
| 11:00 - 11:15 | SUMMARY Mr. Mallik |
| 11:15 - 12:00 | COFFEE AND RAP |

THE
GEORGE
WASHINGTON
UNIVERSITY
MEDICAL CENTER
*2300 Eye Street, N.W. / Washington, D.C. 20037*

*Division of Rehabilitation Medicine*
*Research & Training Center*
Ross Hall, Room 420
(202) 331-6847

December 9, 1974

Mr. and Mrs. Parent
Street Address
Washington, D.C.

Dear Mr. and Mrs. Parent:

We are indeed sorry that you were unable to attend the Parent Orientation given on October 2, 1974. All students selected to participate in the Joint Project being conducted by our staff at George Washington University and the Sharpe Health School were referred to us by Mrs. Marian Siler, the principal at Sharpe.

The purpose of this project is to improve the quality of life for disabled students. Our staff will be evaluating your child to find ways in which he can become more independent. The number of activities your child can perform in self-care and recreation skills will be increased when possible by making simple changes in his surroundings and by supplying him with mechanical aids to increase his strength. We will also concentrate on improving pre-vocational skills. A disabled student can find a good job in areas such as the information industry if he is given a positive attitude toward his future employment possibilities.

As we move forward, our project staff will be keeping you informed of our progress with your child and asking for your cooperation. Please feel free to ask me or members of the staff any questions you might have about our work with your child. After our initial evaluations have been completed, we will be in touch with you.

Sincerely,

Sheldon Yuspeh

Sheldon Yuspeh, Coordinator
Sharpe Health School Project

SY:jj

FUNCTIONAL EVALUATION OF PHYSICALLY DISABLED FOR EMPLOYMENT
The George Washington University Medical Center
Job Development Laboratory
2300 Eye Street, N.W.
Washington, D.C. 20037

I. Background Information:

A. Name_____
B. Address_____
_____
C. Phone_____
D. Age____Birthdate_____Sex _____
E. Marital Status_____
F. Dependents_____

G. Referred by:_____
Address:_____
Phone:_____
Date: _____
Reason: _____
H. Counselor:_____
Address:_____
Phone:_____

I. Social Se
J. Financial
_____
_____
K. Family In
L. Insurance
_____
_____

II. Medical Characteristics:

A. Diagnosis_____
_____
B. Prognosis_____
_____
C. Allergies_____
D. Medications_____

E. Physician:_____
Phone:_____
F. Precautions_____
_____
G. Work Tolerance_____
H. Fatigue_____

I. Medical E
_____
_____
J. Devices E
Adaptive)
_____

55

III. Physical Summary:

IV. Vocational History

A. Education: ☐ Elementary; ☐ High; ☐ Vocational; ☐ Business; ☐ College; ☐ G
B. Vocational Experience:

| Employer | Position | Dates | Liked/Disliked | Reason Job Termi |
|---|---|---|---|---|
| | | | | |
| | | | | |
| | | | | |

C. New Job Search: ____Yes ____ No How soon after job ended?_____Assistance
Methods Used: _____Type job sought _____
D. Hobbies: _____ E. Major time consuming acti

FUNCTIONAL EVALUATION OF PHYSICALLY DISABLED FOR EMPLOYMENT
The George Washington University Medical Center
Job Development Laboratory
2300 Eye Street, N.W.
Washington, D.C. 20037

Appendix D

DATE_____

on:

_____
_____
_____
_____
_____Sex _____
_____
_____

G. Referred by:_____
Address:_____
Phone:_____
Date:_____
Reason:_____
H. Counselor:_____
Address:_____
Phone:_____

I. Social Security #_____
J. Financial Assistance_____
_____
_____
K. Family Income_____
L. Insurance # _____
_____
_____

ics:

_____
_____
_____
_____
_____
_____

E. Physician:_____
Phone:_____
F. Precautions_____
_____
G. Work Tolerance_____
H. Fatigue_____

I. Medical Rehab. Summary_____
_____
_____
J. Devices Presently Used (Orthotic & Adaptive)_____
_____

Elementary; ☐ High; ☐ Vocational; ☐ Business; ☐ College; ☐ Grad School; Other_____

ience:

| | Position | Dates | Liked/Disliked | Reason Job Terminated | Pay |
|---|---|---|---|---|---|
| | | | | | |
| | | | | | |

____Yes ____ No How soon after job ended?_____Assistance _____

_____Type job sought _____Occupation Goal_____

_____ E. Major time consuming activity:_____

V. Physical Characteristics:

| | HAND DOMINANCE | GRASP | | | | | | | | COORDINATION | | | BALANCE | | | REACH | | | | | | WHEEL | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Pinch | Palmer (hold phone) | Lateral (thumb to finger side) | Tip prehension (hold pencil) | Spherical (grasp door knob) | Opposition (thumb to finger tip) | Release (open hand) | Strength | Eye-hand | Hand-mouth | Spasticity | Ataxia | Finger dexterity | Sitting | Chair with arms | Wheelchair | Standing | Walking | VISION | Endurance | Stability | Reach to 90° | Forward - distance | Height " " | Side " " | Strength-lift lbs. | Manual | Electric | Width | Desk Clearance | Removable | Desk |
| Severely Impaired | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Moderately Impaired | | | | | | | | | | | | | | | | | | | | | | R. | | | | | | | | | | |
| Minimally Impaired | | | | | | | | | | | | | | | | | | | | | | L. | | | | | DEVICES NEEDED | | | | | |
| Intact | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

VI. Functional Characteristics:

A. Level of Self-Care

Score:____

| | | DRESSING | | | | | | | | | | | | BATH | | HYGIENE | | | | | | EATING | | | | | HAND MANIPULAT | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Shirt | Pants | Bra | Socks - Hose | Shoes | Tie Shoelaces | Button | Snaps - Hooks | Zipper | Corset | Brace off/on | Belt | Upper Extremity | Lower Extremity | Feet | Back | Comb-brush hair | Wash Hair | Set Hair | Brush Teeth | Shave | Flush Toilet | Faucets | Use Utensils | Cut Meat | Drink from Glass | Cup with handle | Open Sugar Pack. | Door Knobs | Light Switch | Drawers | Objects fr. floor | Clothes fr. closet | Scissors | Wind Watch | Radio-T.V. Switch | Handle Mo | Open |
| LEVEL | Maximum Impaired | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | Moderate Impaired | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | Minimal Impaired | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | Independent | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| TIME | Time: | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | Total Time: | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

56

* Check Everest Jennings wheelchair prescription form.

FUNC. EVAL FORM (Job Development Lab, The Geo. Washington Univ. Medical Center, 2300 Eye St.,

:

| GRASP | | | | | COORDINATION | | | | | BALANCE | | | REACH | | | | WHEELCHAIR EVALUATION | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| on | pencil) | Spherical (grasp door knob) | Opposition (thumb to finger tip) | Release (open hand) | Strength | Eye-hand | Hand-mouth | Spasticity | Ataxia | Finger dexterity | Sitting | Chair with arms | Wheelchair | Standing | Walking | VISION | Endurance | Stability | Reach to 90° | Forward - distance | Height " " | Side " " | Strength-lift lbs. | Manufacturer: | Manual | Electric | Width | Desk Clearance " | Removable | Arms | Desk | Adjustable | Need lapboard? | Does w/c fit? * | Manuver chair? | Apply brakes? | Need seat belt? |
| | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | R. | | | | | | | | | | | | | | | | | YES |
| | | | | | | | | | | | | | | | | | | | L. | | | | | | | | | | | | | | | | NO |
| | | | | | | | | | | | | | | | | | | | | | | | | DEVICES NEEDED (Orthotic &/or Functional) | | | | | | | | | | | | |

cs:

| DRESSING | | | | | | | | BATH | | HYGIENE | | | | | | EATING | | | | | HAND MANIPULATION | | | | | | | | HOUSEHOLD ACTIVITIES | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Shoelaces | Button | Snaps - Hooks | Zipper | Corset | Brace | Belt | off/on | Upper Extremity | Lower Extremity | Feet | Back | Comb-brush hair | Wash Hair | Set Hair | Brush Teeth | Shave | Flush Toilet | Faucets | Use Utensils | Cut Meat | Drink from Glass | Cup with handle | Open Sugar Pack. | Door Knobs | Light Switch | Drawers | Objects fr. floor | Clothes fr. closet | Scissors | Wind Watch | Radio-T.V. Switch | Handle Money | Open Envelopes | Carry Objects | Open cans | Chop Vegetables | Open Milk Carton | Prepare Hot Food | Light Oven | Buy Groceries | Laundry | Dispose Garbage | Wash Dishes | Change Bed |
| | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

wheelchair prescription form.

elopment Lab, The Geo. Washington Univ. Medical Center, 2300 Eye St., N.W. Washington, D.C. 20037)

VII. Functional Characteristics:

B. Ambulation

| | Yes | No |
|---|---|---|
| Walks Independently | | |
| Brace | | |
| Corset | | |
| Cane | | |
| Crutch | | |
| Walker | | |
| Manual Wheelchair | | |
| Electric " " | | |
| Stairs | | |
| Curbs | | |

C. Transfers

| | | |
|---|---|---|
| Rise from Lying | | |
| Rise from Sitting | | |
| Bed | | |
| Chair | | |
| Wheelchair | | |
| Toilet | | |
| Tub | | |
| Shower | | |
| Car | | |
| Stow w/c in Car | | |

D. Transportation

| | | |
|---|---|---|
| Own Car | | |
| Friends Car | | |
| Relative's Car | | |
| Drives Independ. | | |
| Taxi | | |
| Mobile Care Van | | |
| Bus | | |
| Subway | | |
| Train | | |
| Drivers Licence | | |

VIII. Communication.

A. Motor Impairment

| | | |
|---|---|---|
| Receptive | | |
| Expressive | | |
| Hesitation | | |
| Wrong words | | |
| Dysarthria | | |
| No speech | | |

B. Verbal Ability

| | | |
|---|---|---|
| Clear Enunciation | | |
| Verbally Proficient | | |

C. Hearing affected

| Yes | No |
|---|---|
| | |

D. Reading

| | | |
|---|---|---|
| Vision Impaired | | |
| Impairment Corrected | | |
| Can Comprehend | | |
| Hold Books | | |
| Lift Books | | |
| Turn Pages | | |

IX. Work Samples:

A.

| | | |
|---|---|---|
| Writing | | |
| Hold Pencil | | |
| Write | | |
| Print | | |
| Felt Tip Pen | | |
| Ball Point Pen | | |
| Pencil | | |
| Erase | | |

B. Desk Activities

| | | |
|---|---|---|
| Desk Height Needed | | |
| Manipulates Papers | | |
| Paper Clips | | |
| Stapler | | |
| Rubber Bands | | |

C. Keyboard

| | Typing | Calculator |
|---|---|---|
| Table Height | | |
| Speed | | |
| Errors | | |
| Touch Type | | |
| One Finger | | |
| One Hand | | |
| Universal Cuff | | |
| Mouth | | |
| Head Set | | |

D. Telephone

| | | |
|---|---|---|
| Reach | | |
| Dial - Standard | | |
| Touchtone | | |
| Needs Extension Arm | | |
| Needs Speaker phone | | |

E. Filing

| | | |
|---|---|---|
| Cabinets | | |
| Index Card | | |
| Open | | |
| Alphabetical | | |
| Numerical | | |

F. Tape R

| |
|---|
| Reach |
| Press |
| Needs |
| Speech |
| Device |

G. Microf

| |
|---|
| Thread |
| Photog |
| Speed |

H. Xerox

| |
|---|
| Insert |
| Feed D |
| Load P |
| Remove |
| Put in |
| Clean |

I. Microf

| |
|---|
| Insert |
| Operat |
| Record |

X. A. Home S

| |
|---|
| Apartm |
| Detach |
| Nursin |
| Owns |
| Rents |

B. Archit

| |
|---|
| # Step |
| # Floo |
| Elevat |
| Ramps |
| Door W |
| Nonacc |
| Parkin |
| Privac |
| Room f |

XI. Orthotic

teristics:

| | Yes | No |
|---|---|---|
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C. Hearing affected — Yes ☐ No ☐

D. Reading

| | Yes | No |
|---|---|---|
| Vision Impaired | | |
| Impairment Corrected | | |
| Can Comprehend | | |
| Hold Books | | |
| Lift Books | | |
| Turn Pages | | |

IX. Work Samples:

A.

| | Yes | No |
|---|---|---|
| Writing | | |
| Hold Pencil | | |
| Write | | |
| Print | | |
| Felt Tip Pen | | |
| Ball Point Pen | | |
| Pencil | | |
| Erase | | |

B. Desk Activities

| | Yes | No |
|---|---|---|
| Desk Height Needed | | |
| Manipulates Papers | | |
| Paper Clips | | |
| Stapler | | |
| Rubber Bands | | |

C. Keyboard

| | Typing | Calculator |
|---|---|---|
| Table Height | | |
| Speed | | |
| Errors | | |
| Touch Type | | |
| One Finger | | |
| One Hand | | |
| Universal Cuff | | |
| Mouth | | |
| Head Set | | |

D. Telephone

| | Yes | No |
|---|---|---|
| Reach | | |
| Dial - Standard / Touchtone | | |
| Needs Extension Arm | | |
| Needs Speaker phone | | |

E. Filing

| | Yes | No |
|---|---|---|
| Cabinets | | |
| Index Card | | |
| Open | | |
| Alphabetical | | |
| Numerical | | |

F. Tape Recorder

| | Yes | No |
|---|---|---|
| Reach | | |
| Press Switches | | |
| Needs Foot Pedal | | |
| Speech Legible | | |
| Devices | | |

G. Microfilming

| | Yes | No |
|---|---|---|
| Threading | | |
| Photographing | | |
| Speed | | |

H. Xerox

| | Yes | No |
|---|---|---|
| Insert Key | | |
| Feed Document | | |
| Load Paper | | |
| Remove Jammed Papers | | |
| Put in Ink | | |
| Clean Glass Plates | | |

I. Microfilm Editing

| | Yes | No |
|---|---|---|
| Insert Film | | |
| Operate Knobs | | |
| Record Corrections | | |

X. A. Home Situation:

| | Yes | No |
|---|---|---|
| Apartment | | |
| Detached Home | | |
| Nursing Home | | |
| Owns | | |
| Rents | | |

B. Architectural Barriers:

| | Yes | No |
|---|---|---|
| # Steps Into House | | |
| # Floors | | |
| Elevator | | |
| Ramps | | |
| Door Widths | | |
| Nonaccessible Rooms | | |
| Parking | | |
| Privacy | | |
| Room for Equipment | | |

XI. Orthotic Evaluation:

XII. Behavioral Characteristics:

A. Tests: Gen. Intell. Score _____ Test _____ Dates _____ Verbal _____

Kuder Interest Score _____ Highest Interests (1) _____ (2) _____ (

B. Observations:

1. Appearance: Meticulous _____ Neat _____ Poor _____ Neglected _____

2. Motivation (confidence and self-perception)

| | Very Good | Good | Aver |
|---|---|---|---|
| a) Confidence in ability to learn | | | |
| b) Confidence in ability to succeed in work | | | |
| c) Desire to work | | | |

3. Cooperation during interview

a) Participation
___ Initiated discussion
___ Responded appropriately
___ Short responses
___ Avoided speaking

b) Attitude
___ Amiable
___ Suspicious
___ Neutral
___ Hostile

4. Family Support: Emotional Su

| Name | | Good | Adequate | Rejected | |
|---|---|---|---|---|---|
| | Spouse | | | | |
| | Mother | | | | |
| | Father | | | | |
| | Siblings | | | | |

XIII. Physical Characteristics:

A. Hand Dominance _____

B. Physical Evaluation

| | RIGHT | | | | | LEFT | | |
|---|---|---|---|---|---|---|---|---|
| | Strength | Range of Motion | Spasticity | Contracture | Pain | Strength | Range of Motion | Spasticity |
| 1. Shoulder: | | | | | | | | |
| Flexion | | | | | | | | |
| Extension | | | | | | | | |
| Abduction | | | | | | | | |
| Adduction | | | | | | | | |
| Horizontal Abd. | | | | | | | | |
| Horizontal Add. | | | | | | | | |
| 2. Elbow: | | | | | | | | |
| Flexion | | | | | | | | |
| Extension | | | | | | | | |
| 3. Forearm: | | | | | | | | |
| Pronation | | | | | | | | |
| Supination | | | | | | | | |
| 4. Wrist: | | | 70 | | | | | |
| Flexion | | | | | | | | |
| Extension | | | | | | | | |
| 5. Finger: | | | | | | | | |
| Flexion | | | | | | | | |
| Extension | | | | | | | | |

ristics:
tell. Score _____ Test _____ Dates _____ Verbal _____ Math _____
nterest Score _____ Highest Interests (1) _____ (2) _____ (3) _____

Meticulous _____ Neat _____ Poor _____ Neglected _____

| (confidence and self-perception) | Very Good | Good | Average | Poor |
|---|---|---|---|---|
| ce in ability to learn | | | | |
| ce in ability to succeed in work | | | | |
| work | | | | |

during interview

pation
ed discussion
ed appropriately
esponses
speaking

b) Attitude
___ Amiable
___ Suspicious
___ Neutral
___ Hostile

4. Family Support:

| Name | Emotional Support: Good | Adequate | Rejected | Work Expectations: Wants more Independence | Unsure | No Change | No Interest |
|---|---|---|---|---|---|---|---|
| Spouse | | | | | | | |
| Mother | | | | | | | |
| Father | | | | | | | |
| Siblings | | | | | | | |

ics:

_____

n

| h | RIGHT Range of Motion | Spasticity | Contracture | Pain | LEFT Strength | Range of Motion | Spasticity | Contracture | Pain |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | |
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| | | 70 | | | | | | | |
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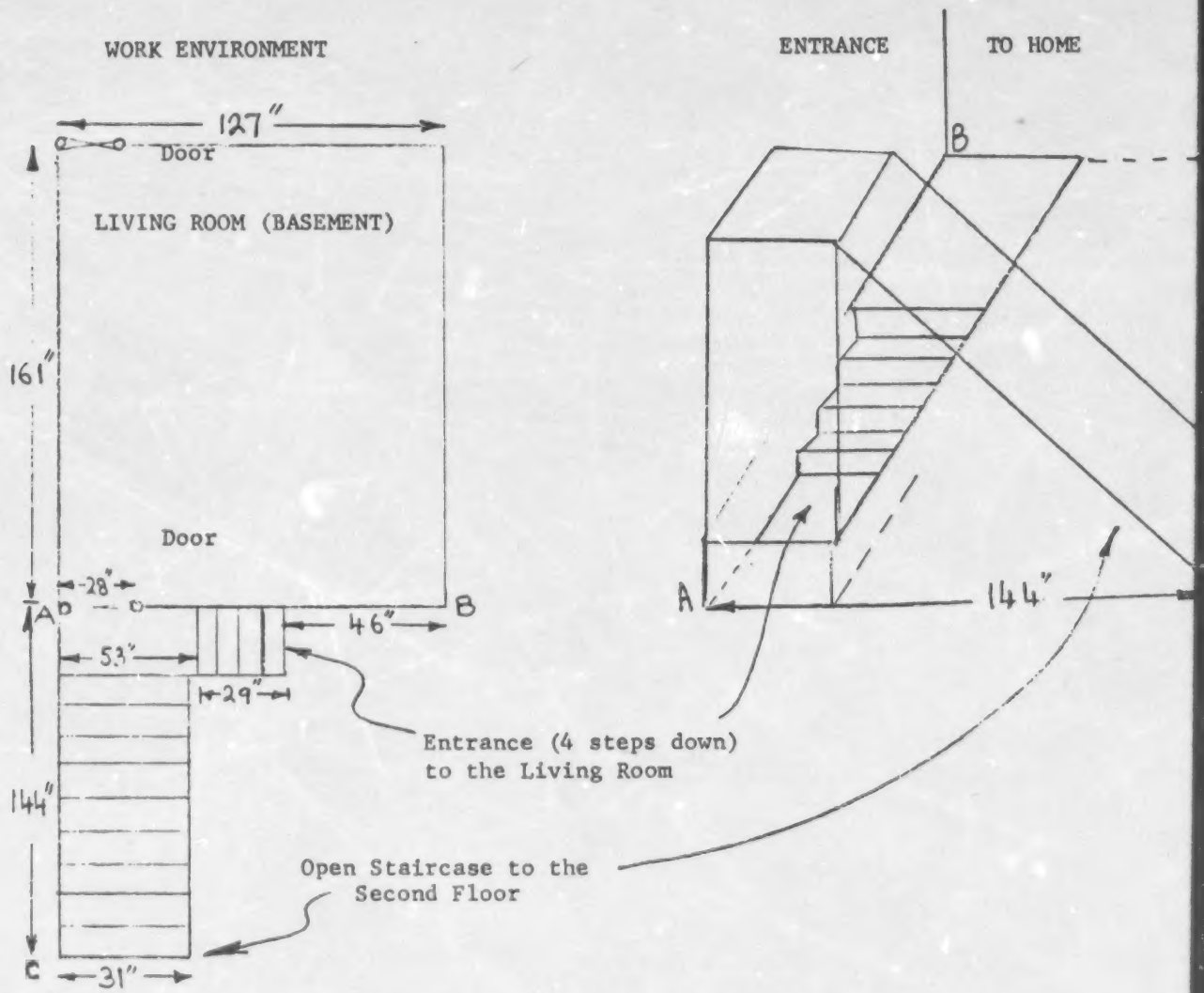
LEGEND

Strength:
P - Poor
F - Fair
G - Good
N - Normal

Spasticity:
S -Severe
Mo-Moderate
Mi-Minimal
N -None


WORK ENVIRONMENT
ENTRANCE
TO HOME
127"
Door
LIVING ROOM (BASEMENT)
161"
Door
28"
A
B
46"
53"
29"
144"
C
31"
Entrance (4 steps down)
to the Living Room
Open Staircase to the
Second Floor
B
A
144"

RONMENT

27"

M (BASEMENT)

B

46"

29"

ENTRANCE TO HOME

B

128"

A

144"

C

Entrance (4 steps down)
to the Living Room

Open Staircase to the
Second Floor

## RECREATIONAL INTERESTS

Have you ever participated in any of the following activities?

| ACTIVITY | YES | | Skill | | | | | | COMMENTS |
|---|---|---|---|---|---|---|---|---|---|
| | F | I | Excellent | Good | Fair | Poor | No, would like to learn | Not interested | |
| **I. Table & Board Games** | | | | | | | | | |
| 1. Checkers | | | | | | | | | |
| 2. Chess | | | | | | | | | |
| 3. NokHockey | | | | | | | | | |
| 4. Pool - Bumper Pool | | | | | | | | | |
| 5. Parcheesi | | | | | | | | | |
| 6. Chinese Checkers | | | | | | | | | |
| 7. Bridge | | | | | | | | | |
| 8. Monopoly | | | | | | | | | |
| 9. Card Games | | | | | | | | | |
| 10. Ping-Pong | | | | | | | | | |
| 11. Shuffleboard | | | | | | | | | |
| 12. Darts | | | | | | | | | |
| 13. Ring Toss | | | | | | | | | |
| 14. Bingo | | | | | | | | | |
| 15. Solitaire | | | | | | | | | |
| 16. Word Games (Scrabble, Spill and Spell) | | | | | | | | | |
| 17. Concentration | | | | | | | | | |
| 18. Puzzles | | | | | | | | | |
| 19. Model Racing Cars | | | | | | | | | |
| 20. Dominoes | | | | | | | | | |
| 21. Bean Bag Toss | | | | | | | | | |
| 22. Other Table Games | | | | | | | | | |
| **Active Games** | | | | | | | | | |
| 1. Basketball | | | | | | | | | |
| 2. Bowling | | | | | | | | | |
| 3. Football | | | | | | | | | |
| 4. Softball | | | | | | | | | |
| 5. Volleyball | | | | | | | | | |
| 6. Badminton | | | | | | | | | |
| 7. Archery | | | | | | | | | |
| 8. Swimming | | | | | | | | | |
| 9. Tennis | | | | | | | | | |
| 10. Croquet | | | | | | | | | |
| 11. Frisbee | | | | | | | | | |
| 12. Horseshoes | | | | | | | | | |
| 13. Sailing/Boating | | | | | | | | | |
| 14. Sledding | | | | | | | | | |
| 15. Wrestling/Boxing | | | | | | | | | |
| 16. Fishing | | | | | | | | | |
| 17. Other active games | | | | | | | | | |

| ACTIVITY | Frequently | Infrequently | Excellent | Good | Fair | Poor | No, would like to learn | Not interested | COMMENTS |
|---|---|---|---|---|---|---|---|---|---|
| II. Crafts | | | | | | | | | |
| 1. Candle making | | | | | | | | | |
| 2. Yarn sculpture | | | | | | | | | |
| 3. Wood & metal working | | | | | | | | | |
| 4. Gardening | | | | | | | | | |
| 5. Collecting (circle) Stamps, photos, coins, posters, rocks, shells, models, dolls, bottles, match covers, recipes | | | | | | | | | |
| 6. Cooking | | | | | | | | | |
| 7. Macrame | | | | | | | | | |
| 8. Knitting-Crocheting | | | | | | | | | |
| 9. Weaving | | | | | | | | | |
| 10. Puppet-making | | | | | | | | | |
| 11. Decoupage | | | | | | | | | |
| 12. Other crafts | | | | | | | | | |
| . Art & Music | | | | | | | | | |
| 1. Photography | | | | | | | | | |
| 2. Painting | | | | | | | | | |
| 3. Sculpture | | | | | | | | | |
| 4. Rhythmic Exercise | | | | | | | | | |
| 5. Singing | | | | | | | | | |
| 6. Plays-Drama | | | | | | | | | |
| 7. Playing Instruments | | | | | | | | | |
| 8. Creative Writing (poetry, stories) | | | | | | | | | |
| 9. Listening to Music | | | | | | | | | |
| . Social Activities | | | | | | | | | |
| 1. Movies | | | | | | | | | |
| 2. Dining Out | | | | | | | | | |
| 3. Travel | | | | | | | | | |
| 4. Camping | | | | | | | | | |
| 5. Reading | | | | | | | | | |
| 6. Television | | | | | | | | | |
| 7. Entertaining Friends | | | | | | | | | |
| 8. Church | | | | | | | | | |
| 9. Clubs | | | | | | | | | |
| 10. Other Social Activities | | | | | | | | | |

Evaluation and Plans:

PSYCHOLOGICAL TESTING

K. S. January 22, 1975

CA 18-10
D.O.B. 3/25/56
Grade 12

TESTS ADMINISTERED:

1/22/75 Wechsler Intelligence Scale for Children (WISC)
(Verbal half of test)
(Performance portion of test was not given in view of visual difficulties)

1/27/75 Peabody Individual Achievement Test (PIAT)
Reading Comprehension Sub-Test

GENERAL OBSERVATIONS:

K. appears to have a slight hearing problem as I needed to speak a little louder than usual to make myself heard clearly and K. asked me to sit on her left side so she could hear me better. That is also the side of her good eye so I assume it was easier for her to see me as well. K. reads fine with large print type--the specific degree of enlargement required can be determined perhaps in specific testing with varied materials.

K. is a proud girl with a very good sense of humor. She enjoys the company of adults and she feels comfortable talking with them and engaging in teasing exchanges. In school, she appears to shine in areas like English where she enjoys writing poetry. She worked hard on the test and tried to do her best.

TEST RESULTS:

On the reading test, K. scored at the top of 7th grade level--7.5-- which would be half way between 7th and 8th grade level. She sounds out words well even if she's never seen them before. She reads slowly but carefully. She tried hard to read perfectly and often went over a word several times to make sure she read it correctly. Her reading recognition, ability to read and sound out words (with no comprehension of meaning required) appears higher than her comprehension. At the higher levels, it was the weakening in her vocabulary that affected her comprehension.

On the WISC, verbal section, K. scored in the normal or average range of intelligence. Her strengths were in verbal reasoning and common sense, social judgment, and in abstract verbal concepts. She was weak in expressing herself in spoken words but writes very sensitive, well-thought-out poetry. Her receptive vocabulary (that which she understands) was weak as was her immediate recall (short-term memory for a string of numbers read to her). K. had some difficulty in the mental computations required for the arithmetic test. She set up the problems well for the most part but made computation errors in her head.

The fact that K. scored average and a little above average in common sense & social judgment skills is very significant as she has had many limited experiences. For example, one question involved a train and she's never been on a train but figured out a logical answer anyway. Occasionally her thoughts became cluttered in her head and she couldn't express clearly what she wanted to say, although she knew what she wanted to say.

Her limited life experiences are in evidence in her vocabulary score as well,as there was much variability and gaps in her knowledge. In other words, she knew some harder words, but missed some easier words, These gaps in knowledge are typical of a student who has had a pattern of illness and absence and whose education time has been broken up somewhat as she went through school. In her speech, she uses good, mature vocabulary but reading (seeing small print) is hard for her so she doesn't read as much as she could and is not exposed to many words.

She can use large print reading materials.

GW/kk

APPENDIX H.

## MUSIC PROGRAM LESSON PLANS

| DATE | PLANS |
|---|---|
| April 2, 1975 | 1. Evaluate the existing musical abilities of the students.(Abilities vary as some students already play such instruments as guitar, electric organ, and drums while others have no formal music background.) |
| | 2. Plan, with the students, the format of the music program by offering them various options such as: learning to read music and play instruments,singing, listening to various forms of music for exposure and appreciation, and choosing the type of music and instruments to which they wish to play and listen. |
| April 9, 1975 | 1. Introduce the concepts of rhythm, beats, and measure to students. |
| | 2. Practice elementary clapping rhythms. |
| | 3. Expose students to various forms of rhythm instruments. (i.e. maracas, tambourine, drum, cymbals, bells, tone blocks, and sound blocks.) Discuss briefly the history of each instrument and the materials of which they are made. |
| | 4. Drill students on simple rhythm exercises using ryhthm instruments. |
| | 5. Recreation time - listen to records. |
| April 16, 1975 | 1. Review drills on ryhthm instruments and have students play instruments to a record of their choice. |
| | 2. Begin instruction in reading music by introducing students to treble clef sign and notes on staff paper. |
| | 3. Instruct students in how to play these notes on the piano and coronet. |
| | 4. Drill students on simple exercises using both instruments. |
| | 5. Recreation time - listen to records. |
| May 6, 1975 | 1. Review basic notes on staff paper and practice exercises on the piano and coronet learned in previous session. |
| | 2. Combine piano, coronet, rhythm instruments and drums in basic exercises and practice. |

| DATE | PLANS |
|---|---|
| | 3. Recreation time - listen to records. |
| May 14, 1975 | 1. Utilizing a song of the students choice, divide students into two groups having one group singing melodies and the other group accompaning on rhythm instruments. |
| | 2. Have students choose two songs that they would like to perform to be worked on in the next session. |
| | 3. Recreation time - listen to records. |
| May 21, 1975 | 1. Assign singing and instrumental assignments to students in the two songs chosen to be performed in the previous session. |
| | 2. Practice the two songs. |
| | 3. Record songs and play back for students at the end of the practice. |
| | 4. Recreation time - listen to records. |
| June 1, 1975 (Final Session) | 1. Students will meet in the school yard and perform the songs practiced during the previous session. Vocals, guitar, drums, electric organ, and rhythm instruments were used in performing the two songs. |
| | 2. Recreation time - listen to records and discuss the successes and failures of the music program with the students. |

# RECREATIONAL RESOURCE FILE QUESTIONNAIRE

Circle "Yes" or "No" and complete the answer in the space provided when necessary.

1. Type of agency (Public, private, commercial, therapeutic)_____

   Name of Agency_____ Phone No._____

   Address_____Contact Person_____

2. Is there a membership cost or fee?_____yes_____No

   If so, how much?_____

3. Is transportation provided?_____yes_____no

   If not, what means of transportation are close to the center:

   List services provided_____

   _____

   _____

4. What are the days and hours that the facility is open?_____

5. Do you have special programs for the physically or mentally handicapped:

   _____yes_____no If yes, please list the programs offered:

   _____

   _____

   _____

   _____

   Are there eligibility requirements?_____yes_____no

   If so, please explain: _____

   _____

   _____

6. Do you provide special adaptations of equipment for handicapped persons?

   _____yes_____no

   If yes, please specify:_____

   _____

   _____

7. Does your facility provide reserved spaces for the physically handicapped?

8. Do sidewalks have curb cuts or ramps? _____yes_____no

9. Is there a passenger loading zone?_____yes_____no

APPROACH & ENTRANCE TO FACILITY

10. Is there a ramp provided to by-pass the steps? _____yes_____no

11. Is the accessible entrance designated for the handicapped?_____yes_____no

12. If there are steps, are hand rails provided?_____yes_____no

13. Is the ramp equipped with hand rails?_____yes_____no

14. What is the width of most accessible entrance doorways (with door open)?

_____

FACILITIES INSIDE OF BUILDING

15. Is the area for public use more than one story? _____yes_____no

16. If so, is there an elevator or ramp that is accessible to the other stories?

_____yes_____no

17. Are room numbers and other directions accessible to the multiply handicapped?

_____yes_____no

18. With regard to restrooms:

(a) What is the width of entrance doorway (door open)?_____

(b) What is the width of stall doorway?_____

(c) Do the stalls have hand rails or grab bars?_____yes_____no

(d) Is there room for a wheelchair inside the staff with door closed?

_____yes_____no

19. Is it preferable that arrangements be made in advance for your facility to accommodate the physically handicapped?_____yes_____no

20. Would the owner be willing to learn how to make the facility more accessible to the handicapped?_____yes_____no

21. If the building is accessible to the handicapped, would the program director be willing to implement a program for the handicapped?_____yes_____no

22. Any additional comments:_____

_____

JOB DEVELOPMENT LABORATORY

REHABILITATION RESEARCH & TRAINING CENTER, THE GEORGE WASHINGTON UNIVERSITY, WASHINGTON, D

JOB ANALYSIS

Agency _____ Position _____ Salary _____ Referer

| ACTIVITY | WEIGHT/REACH | ADAPTATIONS |
|---|---|---|
| 1. OFFICE PROCEDURES<br>Lifting<br>Removing<br>Carrying<br>Stapling<br>Opening<br>Stamping<br>Sorting<br>Unfolding<br>Weighing<br>Collating<br>Filing<br>Turning pages<br>Indexing<br>Scheduling<br>Inserting | | |
| 2. OFFICE MACHINES<br>Cleaning<br>Dialing<br>Holding<br>Inserting<br>Lifting<br>Maintaining<br>Opening<br>Pulling<br>Pushing<br>Threading<br>Turning<br>Unlocking<br>Using Keyboard<br>Carrying | | |

| | % OF TIME |
|---|---|
| 3. COMMUNICATION<br>Hearing<br>Mobility<br>Speaking<br>Tape Recording<br>Typing<br>Writing | |
| 4. COGNITIVE REQUIREMENT<br>Education<br>Math<br>Prob. Solving<br>Reading<br>Training | LEVEL/TYPE |
| 5. OFFICE EVAL.<br>Entrance<br>Steps<br>Door<br>Door mechanism<br>Floor covering<br>Threshold<br>Obstacles<br>Desk<br>File Cabinets | DIMENSIONS |
| 6. BATHROOM EVAL.<br>Door<br>Grab bars<br>Toilet<br>Sink | DIMENSIONS |
| 7. CAFETERIA EVAL.<br>Accessibility | DIMENSIONS |

COMMENTS:

JOB DEVELOPMENT LABORATORY

Appendix J

CH & TRAINING CENTER, THE GEORGE WASHINGTON UNIVERSITY, WASHINGTON, D.C. 20037 (202) 331-6847

JOB ANALYSIS

Position _____ Salary _____ Reference _____

| EIGHT/REACH | ADAPTATIONS | | % OF TIME | ADAPTATIONS |
|---|---|---|---|---|
| | | 3. COMMUNICATION<br>Hearing<br>Mobility<br>Speaking<br>Tape Recording<br>Typing<br>Writing | | |
| | | 4. COGNITIVE REQUIREMENT | LEVEL/TYPE | RECOMMENDATIONS |
| | | Education<br>Math<br>Prob. Solving<br>Reading<br>Training | | |
| | | 5. OFFICE EVAL. | DIMENSIONS | ADAPTATIONS |
| | | Entrance<br>Steps<br>Door<br>Door mechanism<br>Floor covering<br>Threshold<br>Obstacles<br>Desk<br>File Cabinets | | |
| | | 6. BATHROOM EVAL. | DIMENSIONS | ADAPTATIONS |
| | | Door<br>Grab bars<br>Toilet<br>Sink | | |
| | | 7. CAFETERIA EVAL. | DIMENSIONS | ADAPTATIONS |
| | | Accessibility | | |

Appendix K

THE
GEORGE
WASHINGTON
UNIVERSITY
MEDICAL CENTER

*2300 Eye Street, N.W. / Washington, D.C. 20037*

*Division of Rehabilitation Medicine*
*Research & Training Center*

(202) 331-6847
Ross Hall - Room 420

# BIO-ENGINEERING SERVICES TO DEVELOPMENTALLY DISABLED ADOLESCENTS

## Board of Advisors Meeting
March 5, 1975

| | |
|---|---|
| 9:30 - 9:35 | Welcome Address and Staff Introduction. Dr. F. Leonard |
| 9:35 - 9:45 | Objectives of the Project. K. Mallik |
| 9:45 - 9:55 | Cooperation of the Sharpe Health School. M. Siler |
| 9:55 - 10:05 | Student and Parent Education. S. Yuspeh |
| 10:05 - 10:15 | Functional Evaluations. E. Smith |
| 10:15 - 10:25 | Recreational Evaluations. K. Moyers |
| 10:25 - 10:40 | Bio-Engineering Adaptations. J. Mueller |
| 10:40 - 10:50 | Orthotic Devices. Dr. H. Goller |
| 10:50 - 11:00 | Vocational Training. K. Mallik |
| 11:00 - 11:10 | Vocational Placement. R. Sablowsky |
| 11:10 - 11:20 | Discussant. E. Schoenfeld |
| 11:20 - 12:00 | General Discussion and Recommendations. |

THE
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MEDICAL CENTER

*2300 Eye Street, N.W. / Washington, D.C. 20037*

*Division of Rehabilitation Medicine*
*Research & Training Center*

(202) 331-6847

BIO-ENGINEERING SERVICES
TO
DEVELOPMENTALLY DISABLED ADOLESCENTS

Participants: Board of Advisors Meeting
March 5, 1975

STAFF

| | |
|---|---|
| K. Mallik | Principal Investigator and Bio-Engineer |
| S. Yuspeh | Research Assistant and Project Coordinator |
| E. Smith | Occupational Therapist |
| K. Moyers | Recreational Therapist |
| J. Mueller | Industrial Designer |
| R. Sablowsky | Vocational Coordinator |
| K. Hutcherson | Orthotist Assistant |

ADVISORS AND CONSULTANTS

| | |
|---|---|
| Dr. F. Leonard | Director of Research, Rehabilitation Research and Training Center (RT-9) |
| Dr. D. Hawkins | Director of Research Utilization (RT-9) |
| Dr. G. Folsom | Project Director: Life Skill for Developmentally Disabled (RT-9) |
| T. West | Administrator, Rehabilitation Medicine |
| Dr. H. Goller | Assistant Research Professor of Orthopaedic Surgery; Prosthetist/Orthotist (RT-9) |
| M. Siler | Principal, Sharpe Health School |
| M. Crawford | Coordinator, Physical and Occupational Therapy, Division of Maternal Child Health, Department of Human Resources |
| K. Singleton | Rehabilitation Counselor, Bureau of Rehabilitation Services, Department of Human Resources |
| W. Hersey | The John F. Kennedy Institute |
| E. Schoenfeld | Developmental Disabilities Specialist, Rehabilitation Services Administration, Region III |

THE
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*2300 Eye Street, N.W. / Washington, D.C. 20037*

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*Research & Training Center*

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BIO-ENGINEERING SERVICES
TO
DEVELOPMENTALLY DISABLED ADOLESCENTS

Sharpe Health School Staff Orientation

March 19, 1975

| | |
|---|---|
| 2:30 - 2:35 | Welcome Address - M. Siler |
| 2:35 - 2:45 | Objectives of the Project - K. Mallik |
| 2:45 - 2:55 | Orthotic Devices - K. Hutcherson |
| 2:55 - 3:05 | Student and Parent Education - S. Yuspeh |
| 3:05 - 3:20 | Functional Evaluations and Bio-Engineering Adaptations - K. Mallik |
| 3:20 - 3:30 | Recreational Evaluations - K. Moyers |
| 3:30 - 3:40 | Vocational Training and Placement - S. Yuspeh |
| 3:40 - 4:00 | General Discussion and Recommendations. |

Appendix M

THE
GEORGE
WASHINGTON
UNIVERSITY
MEDICAL CENTER

*2300 Eye Street, N.W. / Washington, D.C. 20037*

*Division of Rehabilitation Medicine*
*Research & Training Center*

(202) 331-6847

BIO-ENGINEERING SERVICES
TO
DEVELOPMENTALLY DISABLED ADOLESCENTS

Sharpe Health School Parent and Student Orientation

March 26, 1975

| | |
|---|---|
| 10:00 - 10:05 | Welcome Address - M. Siler |
| 10:05 - 10:15 | Objectives of the Project - K. Mallik |
| 10:15 - 10:25 | Orthotic Devices - K. Hutcherson |
| 10:25 - 10:35 | Student and Parent Education - S. Yuspeh |
| 10:35 - 10:50 | Functional Evaluations and Bio-Engineering Adaptations - K. Mallik |
| 10:50 - 11:00 | Recreational Evaluations - K. Moyers |
| 11:00 - 11:10 | Vocational Training and Placement - S. Yuspeh |
| 11:10 - 12:00 | General Discussion and Recommendations. |

Appendix N

THE
GEORGE
WASHINGTON
UNIVERSITY
MEDICAL CENTER

*2300 Eye Street, N.W. / Washington, D.C. 20037*

*Division of Rehabilitation Medicine*
*Research & Training Center*

(202) 331-6847

# BIO-ENGINEERING SERVICES TO DEVELOPMENTALLY DISABLED ADOLESCENTS

Participants: Board of Advisors Meeting
June 10, 1975

## STAFF

| | |
|---|---|
| K. Mallik | Principal Investigator and Bio-Engineer |
| S. Yuspeh | Research Assistant and Project Coordinator |
| R. Sablowsky | Vocational Coordinator |

## ADVISORS AND CONSULTANTS

| | |
|---|---|
| Dr. F. Leonard | Director of Research, Rehabilitation Research and Training Center (RT-9) |
| Dr. D. Hawkins | Director of Research Utilization (RT-9) |
| M. Crawford | Coordinator, Physical and Occupational Therapy, Division of Maternal Child Health, Department of Human Resources |
| M. Siler | Principal, Sharpe Health School |
| W. Hersey | The John F. Kennedy Institute |
| M. Shoob | Program Management Officer, Office of Research, Rehabilitation Services Administration, HEW |

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